VISIT…

Science Is Fiction

The Films of Jean Painlevé

EDITED BY ANDY MASAKI BELLOWS, MARINA MCDOUGALL
AND BRIGITTE BERG

Science Is Fiction

THE MIT PRESS CAMBRIDGE, MASSACHUSETTS LONDON, ENGLAND

BRICO PRESS SAN FRANCISCO, CALIFORNIA

SCIENCE IS FICTION

THE FILMS OF JEAN PAINLEVÉ

EDITED BY ANDY MASAKI BELLOWS AND MARINA MCDOUGALL

WITH BRIGITTE BERG

TRANSLATIONS BY JEANINE HERMAN

©2000 Brico Press

All of Jean Painlevé's original work including images from films, photographs, and writings.
© 2000 Les Documents Cinématographiques

"Introduction: Hybrid Roots" by Marina McDougall. © 2000 Marina McDougall

"Contradictory Forces: Jean Painlevé, 1902–1989" by Brigitte Berg. © 2000 Brigitte Berg

"Fluid Mechanics" by Ralph Rugoff. © 2000 Ralph Rugoff

"L'Institut dans la cave" (Institute in the Cellar) by Léo Sauvage from *Regards*, 10 May 1935. © Léo Sauvage

"A Clay Blue Beard" by Patricia Hutchins from *Sight and Sound* vol. 7, no. 26, 1938 MFB. © Sight and Sound

"Le Film scientifique: Beauté du hasard" (Science Film: Accidental Beauty) by André Bazin from *L'Écran français* no. 121, 21 October 1947. © Janine Bazin

"Jean Painlevé qui fait voir l'invisible" (Jean Painlevé Reveals the Invisible), interview by Hélène Hazéra and Dominique Leglu from *Libération*, 15–16 November 1986. © Libération

Stills from *Le Sang des bêtes* (Blood of the Beasts) by Georges Franju, 1949. © Franju

Photograph: "Jean Painlevé à son arrivée à Nice, 1932" (Jean Painlevé on his arrival in Nice, 1932) taken by Jean Vigo, 1932. © Luce Vigo

Photograph: "Hippocampe Jewelry" taken by Philippe Halsman, 1936. © Halsman Estate

Photograph: "Underwater Bicyclist" taken by Philippe Halsman, 1936. © Halsman Estate

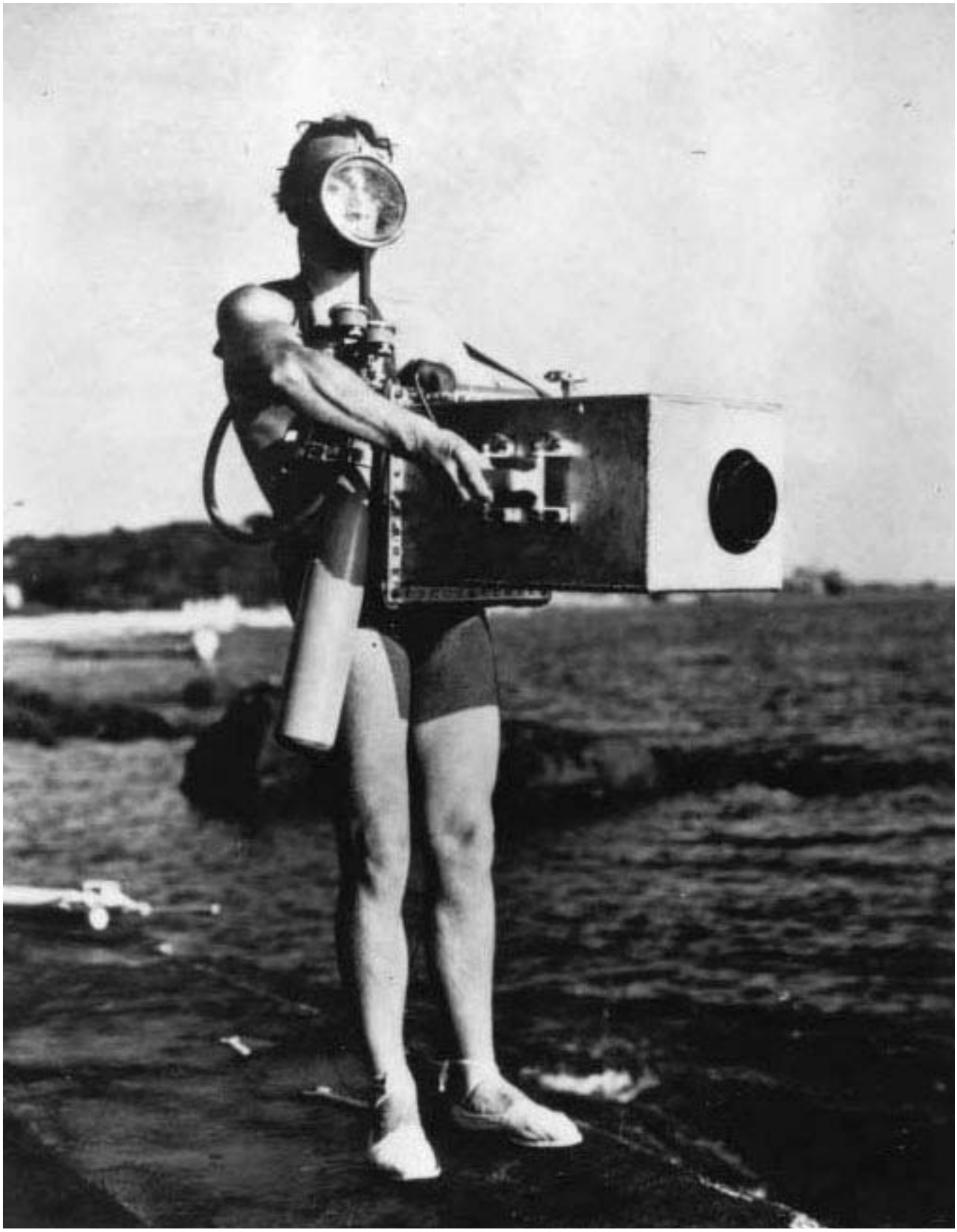
All rights reserved. No part of this book may be reproduced in any form by any electronic or mechanical means (including photocopying, recording, or information storage and retrieval) without permission in writing from the publisher.
This book was set in Matrix.
Printed and bound in the United States of America.
Library of Congress Cataloging-in-Publication Data
Science is fiction : the films of Jean Painlevé / edited by Andy Masaki Bellows and Marina McDougall ; translations by Jeanine Herman.
p.cm.
Includes bibliographical references and index.
ISBN 0-262-02472-1 (hc. : alk. paper)
1. Underwater cinematography. 2. Painlevé, Jean. I. Painlevé, Jean. II. Bellows, Andy Masaki. III. McDougall, Marina.

TR893.8 .S354 2000
791.43'0233'092—dc B
[2]

99-045932

You alone stand as a competitor to Our Lady of Lourdes, as far as miracles are concerned . . .

—Sergei Eisenstein in a letter to Jean Painlevé



Contents

The Seahorse by Jean Painlevé . . . . . *xiii*

Introduction: Hybrid Roots by Marina McDougall . . . . . *xiv*

Contradictory Forces: Jean Painlevé, 1902-1989 by Brigitte Berg . . . 2

Fluid Mechanics by Ralph Rugoff *48*

Contents *(continued)*

Photograms. *58*

Methuselah *60*

Hyas and Stenorhynchus . *64*

The Seahorse. *68*

The Fourth Dimension. . . . *72*

The Vampire *76*

Freshwater Assassins. . . . *80*

Blood of the Beasts. *82*

Blue Beard *86*

Sea Urchins. *90*

The Love Life of the Octopus. . . *94*

Acera or The Witches' Dance. . . *98*

Photography. *102*

Neo-Zoological Drama by Jean Painlevé. *116*

Mysteries and Miracles of Nature by Jean Painlevé. *118*

Institute in the Cellar by Léo Sauvage. *124*

Feet in the Water by Jean Painlevé *130*

A Clay Blue Beard by Patricia Hutchins *140*

Science Film: Accidental Beauty by André Bazin *144*

Contents *(continued)*

The Castration of the Documentary by Jean Painlevé *148*

The Ten Commandments by Jean Painlevé *158*

Scientific Film by Jean Painlevé *160*

Jean Painlevé Reveals the Invisible by Hélène Hazéra and Dominique Leglu. . *170*

Selected Filmography 180

Selected Television and Radio Programs 188

Selected Writings by Jean Painlevé 190

Selected Writings on Jean Painlevé 194

Contributors 202

Acknowledgments 203

Index 205

A ceux
qui luttent ardemment pour
améliorer leur chance quotidienne,
A celles qui souhaitent un compagnon délaissant l'habituel
égoïsme afin de partager leurs peines comme leurs joies,
Ce symbole d'une ténacité qui joint
l'effort le plus viril aux soins
les plus maternels.

THE SEAHORSE

Jean Painlevé

Mystery and miracle of secret waters, the seahorse gives its vertical gait, unique among ocean vertebrates, a lofty and rigid sadness, masking the strange suppleness with which, head suspended in the air as though freed of gravity, it winds its way through the algae.

A surprising fact: giving birth is the male's act. In the course of multiple and graceful embraces, the female places about two hundred eggs in a pouch beneath the male's stomach, which he fertilizes. This pouch is not only protective, the constriction of its blood vessels contributes to the embryos' nutrition. The male undergoes a real and apparently extremely painful delivery five weeks after the wedding.

Everything about this animal, a victim of contradictory forces, suggests that it has disguised itself to escape, and in warding off the fiercest fates, it carries away the most diverse and unexpected possibilities.

To those who struggle ardently to improve their everyday luck, to those who wish for a companion who would forgo the usual selfishness in order to share their pains as well as their joys, this symbol of tenacity joins the most virile effort with the most maternal care.

INTRODUCTION: HYBRID ROOTS

Marina McDougall

To discover the films of Jean Painlevé today is to be struck by a sense of having been deprived—of having missed the passionate *Love Life of the Octopus* in one's childhood—and to regret the absence of Painlevé from film history canons.

The joy of experiencing these films, short cinematic gems that renew a sense of the mystery and miracle of nature, is to unearth a still fertile root of cinema and the revelation that there are film hybrids yet to be realized. Looking back at Painlevé's filmic marvels suggests new and multiple directions forward and reminds us that cinema was scientific before it was fiction.

Some of the neglect is understandable considering that entire genres of cinema escape critical attention despite their ubiquity—particularly science, nature, and educational film. Painlevé was an early visionary of these genres, which had yet to be established at the time he began his work in 1927. In his artful hands, the first seedlings of these genres were crossbred with what was then just being described as avant-garde film.

How Painlevé slipped between the cracks of film history owes as much to his own anarchic tendencies as it does to historical oversight. He eschewed scientific dogma, claiming "science is fiction," and delighted in conflating fixed categories of all kinds.

To retrace the roots of cinema back to Painlevé is to uncover a rich vein of films and filmmakers—some even more neglected—whose work could also be characterized by a hybrid quality: anthropological accounts that unfold like fiction such as Knud Rasmussen's *The Wedding of Palo* (1934), painterly depictions of technological processes like Joris Ivens's *The Bridge* (1928), absurd juxtapositions of banal observations exemplified by Jean Vigo's satiric *A pro-*

pos de Nice (1929), animated fables by natural history curators like Ladislav Starevitch, city symphonies such as Dziga Vertov's exuberant *The Man with the Movie Camera* (1929), and mechanical ballets such as Eugene Deslaw's *The March of Machines* (1928). We can see this mixing and matching of approaches among the informal network of filmmakers who swapped films with Painlevé to show at ciné-club screenings throughout Europe: Luis Buñuel's black humor, social reportage *Land without Bread* (1932), which is marked by the surreal disjunctions of his subsequent fiction films; Jean Vigo's *L'Atalante* (1934), a moody, atmospheric love story filmed with a nonfiction approach; Joris Ivens's *Rain* (1929), a poetic abstraction on rain and the modern city of Amsterdam; and works by hundreds of other contemporaries between New York and Moscow.

Still, Painlevé, with his otherworldly observations of underwater fauna, his lyrical and instructive animal behavior films set to avant-garde scores, remains unique among his peers in the fusion of art and science. While to most artists science remained a specialized domain restricted to practitioners, Painlevé kept one foot planted in the biology laboratory, the other in murky waters teeming with aquatic life. In the article entitled "Feet in the Water" (1935), he writes of his passion for fieldwork: "The job has its joys for those who love the sea. (For those, that is, who love the sea to the exclusion of all else.) Wading around in water up to your ankles or navel, day and night, in all kinds of weather, even when there is no hope of finding anything; investigating everything whether it be algae or an octopus. . . . This is the ecstasy of an addict. . . ." In "Institute in the Cellar" (1935), writer Léo Sauvage describes Painlevé and company in their subterranean urban science laboratory with its "menagerie" of little bowls and basins filled with curious marine life, its table of microscopes, and its clutter of custom-made camera apparatus: "There is something bohemian about Jean Painlevé's Institute, something fresh, youthful, spirited, bustling, and unconventional that challenges the mummified science of the Academy in the most insolent way." Man Ray turned to Painlevé when he needed real starfish footage for his film *The Starfish* (L'Etoile de mer,

1928), and a jar of pickled human hands was surreptitiously procured for Jean Vigo as a prop for Michel Simon's character in *L'Atalante*. When Painlevé invited Buñuel to view a film of real eye surgery, the material proved too strong for him. A repulsed Buñuel exclaimed, "Do you really believe that just because I cut open an eye in a fim, that I like this sort of thing? . . . operations horrify me. I can't stand the sight of blood."

In retrospect, what might seem to be hybrid properties today—the inventive mix of approaches, styles, and sensibilities in the work of Painlevé and his contemporaries—was perhaps only natural alchemy in the 1920s and 1930s. In this era, even the classifications of fiction and documentary had yet to become entrenched in fixed and rigid categories. Since then, as filmmaking has proliferated, film genres and subgenres have developed, narrowed, and mutated into more predictable forms and film watching experiences.

Painlevé witnessed this devolution. His polemic "The Castration of the Documentary," which appeared in *Les Cahiers du cinéma* in 1953, bemoans the "mediocre documentaries" that were then being churned out and rails that "the unexpected, the unusual, the lyrical—all have vanished. . . ." Complaining of the lack of "any connection between filmmaker and subject," he calls for "the genius of a Robert Flaherty or a Joris Ivens . . . to break through the . . . barrier of indifference."

Beyond his work as a filmmaker, Painlevé, as a curator and film advocate, was passionately engaged in the exhibition and promotion of science film. As founder of the Institute of Scientific Cinema (ICS), Painlevé imported thousands of science films over the years, screening them in programs marked by an inspired eclecticism—an international mix of industrials, laboratory experiments, popularized science, and lyrical studies of everyday phenomenon. Walt Disney shared the bill with Hans Richter, General Electric, the Film Board of Canada, and an obscure Swiss film on vitamin E.

In 1947, French film critic André Bazin, reviewing one such festival at the Palais de Chaillot, struggles to come to a definition of the "science film" based on the program assembled and commends Painlevé for including Arne

Sucksdorff's *The Rhythm of the City*, "under I do not know what fallacious but very agreeable pretext." In the end Bazin concludes, "the bounds of the science film are as undefined as those of the documentary. . . . But, after all, who cares!"

In his article "Scientific Film" (1955), Painlevé pays homage to science filmmaking pioneers. Among the ranks are Lucien Bull (student of Etienne-Jules Marey), whose images of bullets penetrating plywood and dragonflies ascending from pin heads were captured at up to 25,000 images per second; Dr. Comandon, creator of filmed microscopy; and Dr. Doyen, one of the first to document medical surgeries including the astonishing *Separation of the Siamese Twins Radika and Dodika* in 1897. Although Painlevé worked side by side with scientists, he made a distinction between the research films created for the science community and films that popularized science for the public. It is in this latter category that Painlevé is most celebrated.

Yet, as a pioneer of science cinema, particularly underwater filmmaking, Painlevé, with his idiosyncratic sensibility, did not reach mass audiences like the better-known Frenchman Jacques Cousteau. A former naval officer who rejected the title "documentarist" for that of "adventurer," Cousteau was a subaquatic astronaut bringing sunken ships, manatees, and mating sperm whales of the ocean depths into the homes of millions. Two decades earlier Painlevé's underwater breakthrough occurred on another scale entirely. It was in the early thirties in the Bay of Arcachon where he managed to capture on camera glimpses of the delicate seahorse wafting in the tide while he, tethered to a boat via a ten-meter hose, gulped in air being frantically pumped to him manually. Painlevé, in contrast to Cousteau's high-tech adventures of the boundless sea, worked mostly in the controlled theater of the aquarium and when it came to things technical he was a bricoleur, a tinkerer patching together camera apparatus to meet a specific need. While Cousteau's adventurer style of nature filmmaking has set the standard for the genre, Painlevé's more personal and lyrical animal behavior studies have been left dangling, a root of cinema rich with untapped potential.

Today, as in Painlevé's era, the art/science filmmaker remains a rare breed, and the artful science and nature film a welcome aberration. For the most part artists have abandoned the science and nature film genres and allowed them to be defined by the conventional television journalism of Nova, National Geographic, Discovery Channel, and the like. Today we need the genius of a Painlevé to break through the barrier of indifference!

Until then, we can take solace in the fact that a hybrid sensibility—one that happily confuses clinical observation with idiosyncratic interpretation; abandon and delight with pedagogical zeal—lies at the base of the film family tree. Given the sober state of contemporary science and nature filmmaking, Painlevé's films provide healthy provocation to a new generation. These films that arrest our attention to marvel at nature's unimaginable cache of wonders, with their humor, lyricism, and uncommon beauty, remain ahead of their time and in urgent need of rediscovery.

Science Is Fiction

CONTRADICTORY FORCES:

JEAN PAINLEVÉ, 1902-1989

Brigitte Berg

In 1954, Henri Langlois, the director of the Cinémathèque française, invited Jean Painlevé to show his films at a festival in Basel, Switzerland. In a letter to Painlevé, Langlois explained that in the program notes for the festival he had avoided using the word "scientific" when referring to Painlevé's films, replacing it with "avant-garde," which, Langlois wrote, "will allow us to show science films without naming them so."

This was not the first time—nor the last—that the question of just what to call Jean Painlevé's work would arise. In the more than two hundred films he made during his lifetime, the subject matter was almost exclusively science, yet Painlevé freely indulged in artistic license. Indeed, the seemingly separate worlds of science and art would mingle and merge in Painlevé's films, and the resulting fusion, such as a documentary on a vampire bat set to a jazz soundtrack, would at times delight, at other times baffle those who came across it for the first time.

And just as Painlevé's work eluded categorization, so did his life. On the one hand, he was the well-brought-up son of a French prime minister; an accomplished scientist who presented studies at the Académie des sciences; and an efficient administrator who helped rebuild a French film industry ravaged by war. On the other hand, he was a self-proclaimed "popularizer" who, despite the scorn of many of his academic colleagues, made the first science films for the general public; a committed political activist who participated in the Resistance; and a spirited maverick who played poker with the Surrealists, cofounded an underwater club called the Drunkard's Club, and raced sports cars professionally.

"I've always mixed things up,"[1] Painlevé told a journalist in an interview conducted toward the end of his life. And yet when viewed together, the seemingly contradictory forces that shaped both Jean Painlevé's work and his life ultimately reveal a common theme: a seriousness of purpose matched with a playfulness of spirit.

ORIGINS: THE FAMOUS FATHER AND THE MISSING MOTHER

Jean Painlevé was born on November 2, 1902, in Paris, the only son of Paul

Paul Painlevé with Jean, 1903.

Marguerite Petit de Villeneuve (Gaëte), 1902.

Painlevé, a prominent mathematician who also served as French prime minister, and Marguerite Petit de Villeneuve, a member of the "petite noblesse," who died shortly after Jean's birth.

Growing up, Jean was often called "the president's son," because of his father's many achievements. Born in Paris in 1863, Paul Painlevé received a doctorate in mathematics in 1887 and went on to teach at the Ecole Polytechnique in Paris. Using functions now known as "Painlevé equations," he solved differential equations that had until then stumped such eminent mathematicians as Henri Poincaré and Emile Picard. In 1900, at the age of thirty-seven, Paul Painlevé became the youngest member ever admitted to the prestigious Académie des sciences; eighteen years later, he would become its president.

In 1902, Paul Painlevé married Marguerite Petit de Villeneuve (endearingly referred to as Gaëte), whose family had considerable real estate holdings in Paris and whose maternal uncle, Georges Clairin, was a well-established academic painter best known for his work in the Paris Opera and for his portraits of the actress Sarah Bernhardt (with whom he had a long-standing love affair). Pregnant at the time of the marriage, Gaëte gave birth to Jean, then fell ill with puerperal fever and died two months later. Paul Painlevé never remarried; his widowed sister, Marie, helped tend the household and raise young Jean.

In 1908, Paul Painlevé published a study on flight entitled "Aviation."[2] (His earlier work on fluid mechanics was influential in the development of flight.) That same year, he became Wilbur Wright's first passenger, their one-hour-and-ten-minute flight setting a speed record. In 1930, he would become the first minister of aviation.

For Paul Painlevé, as would be the case with his son, science could not be dissociated from human values. At a time when intellectuals in general and scientists in particular were uninvolved in any type of social action, Paul Painlevé and a group of scientists on the Left took up Dreyfus's cause[3] shortly after the publication of Emile Zola's "J'accuse" (1898) in an effort to have reason prevail over passion, and truth and justice over zealotry and bigotry.

Paul Painlevé officially entered politics in 1910 as deputy of the fifth arrondissement (the Latin Quarter) in Paris. Five years later, he became minister of education. In March 1917, during the First World War, he became minister of war where he promoted Philippe Pétain to general, the right-wing military official who would later lead Vichy France. Paul Painlevé explained his decision by saying that Pétain was, at the time, "the least treacherous of the generals."

Six months later, Paul Painlevé was named prime minister. (He would later serve again in 1925.) Opting for a moderate line between the Left and the Right, he pursued a policy of containment with the Austro-Hungarian Empire promoting the "white peace." Two months later, however, he was replaced by the more hawkish Georges Clemenceau. (Of his father's defeat, Jean Painlevé would later write, "It meant one more year of war and 300,000 more dead. . . ."[4])

Though Paul Painlevé's work often kept him away from his son, the two maintained a close and tender relationship. Whenever away, Paul Painlevé would write letters to his son addressed "Mon Jean chéri" or affectionately "Mon petit rat." Years later, when a colleague expressed puzzlement that Paul Painlevé would tolerate his son's participation in a public demonstration against the state policy in French Morocco—a policy, after all, initiated by his father—Paul Painlevé replied: "I prefer that to having a son with the soul of a notary public."[5]

Paul Painlevé died of a heart attack on October 29, 1933, leaving behind a son who would reflect many of his most cherished values. Paul Painlevé was granted a state funeral at the Pantheon, the last repose for France's illustrious. Today a square in Paris's Latin Quarter bears his name.

GROWING UP: SCHOOL VERSUS CINEMA AND THE ZOO

Due to his father's progressive politics, which were unpopular at the elite schools young Jean Painlevé attended, he was often ostracized and teased by fellow students. "My only friends in school were Jews and outcasts," he would later write.

Painlevé took refuge at the Saint Michel theater, the first cinema on the Left Bank. There he and his nanny would watch the comedies of Mack Sennett, the fantasies of George Méliès, and the cartoons of Emile Cohl, as well as the popular serials *Le Masque aux dents blanches*, *Les Mystères de New York*, and *Fantômas*, which "obliged one to hold one's breath till the following week's conclusion."[6]

Spending summers on the coast of Brittany at Ker Ster, the house his maternal grandmother rented each year, Painlevé developed his lifelong love for the sea. As a boy he spent hours on the beach, hunting for seashells and collecting tiny sea creatures that he brought back with him to Paris, keeping them alive in the bathtub.

At age eight, he began taking photographs. Using a crude 4 x 4 cm box camera (the bottom of a glass bottle served as its lens and its aperture consisted of a mobile plate with two openings: a large one for dark conditions, a small one for light), Painlevé shot "anything and everything that seemed curious." When he was given a Kodak Brownie number zero, the first mass-produced aim-and-shoot camera, he began to take snapshots of natural scenes such as the sun setting over the seaside town of Les Sables d'Olonnes.

At the prestigious Lycée Louis le Grand, Painlevé studied mathematics with the intention of going on to the Ecole Polytechnique, the university where his father once taught. But Painlevé became disillusioned with the rigid way mathematics was being taught at the time. (Painlevé would later explain that he would have preferred it if in school mathematics had been approached as a language, a tool, and not something veiled in a shroud of mythological prestige.) Often, instead of attending classes, Painlevé would spend his days at the Jardin des Plantes helping the animal keeper feed the animals. His report cards would read "Almost always absent," "Never appeared," "Has produced nothing." His father simply remarked, "I suspected it." (Years later, in 1935, when the Lycée's alumni association wished to honor him and his father, Jean Painlevé, while accepting for his father, declined for himself. "I seriously intend to contribute, albeit with my modest means, to the complete undoing

Geneviève Hamon, 1923.

Paul Wintrebert's zoology class at the Sorbonne, 1922.

Jean Painlevé with the Hamon family, Brittany, 1923.

of secondary education," he wrote to the association's president. "It has always deeply disgusted me. . . . and, never having kept company with my classmates then, I have no desire in keeping company with them now.")

EARLY ADULTHOOD: INSECT LARVAE AND GOOSE EGGS

Upon graduation from the Lycée, Painlevé gave up mathematics altogether and entered the Sorbonne in 1921 to study medicine. But two years later, after a disagreement with one of his professors (whose cruel treatment of a despondent hydrocephalic patient revolted Painlevé), he also abandoned medicine, deciding instead to study zoology and biology.

While taking courses at the Roscoff Marine Biology Station, a laboratory affiliated with the Sorbonne, a fellow student introduced Painlevé to her younger sister, Geneviève Hamon. Geneviève—nicknamed "Ginette"—was the youngest daughter of Augustin and Henriette Hamon, who were writers, libertarian anarchists, and translators of George Bernard Shaw. Painlevé and Ginette fell in love. And though the two never married—neither believed in the institution of marriage—they would become lifelong companions and collaborators.

Painlevé spent his summers with Ginette in Brittany at Ty an Diaoul, "The Devil's House," adopting as a second residence her family's sprawling home. There they set up a studio and darkroom and, over the years, turned it into a kind of salon for visiting scientists, artists, and various members of the avant-garde.

Friends from the Sorbonne, such as Jacques Boiffard, who would later become Man Ray's assistant, lodged at Ty an Diaoul. Other visitors included the filmmaker Pierre Prévert, who contented himself with the drawing of "exquisite corpses";[7] the photographer Eli Lotar, who would, for a short time, become Painlevé's cameraman; and, in the 1930s, artist Alexander Calder. "One could not leave any sort of metal object within Calder's reach," Painlevé would later write. "He would immediately transform spoons, knives, antennas, alarm clocks. His inventions were limitless."[8] Days at Ty an Diaoul were spent

Jean Painlevé on the beach, Brittany, 1927.

playing pranks and taking photographs. Evenings were spent, as Painlevé would later recount, "playing poker with zeal and green beans."

Ginette would later collaborate on most of Painlevé's films, operating equipment, designing sets, and caring for the animals. And every year from Ty an Diaoul, she would send a small package to Painlevé in Paris: the first

Geneviève Hamon, Ty an Diaoul, 1928.

Jean Painlevé photographed by Geneviève Hamon, 1927.

Jean Painlevé and Dr. Maurice Parat at the Sorbonne, 1923.

asparagus shoots and goose eggs of the season and a jar of her homemade mayonnaise. Indeed, Ginette's dedication would later prompt a colleague to ask, "Would a single film have existed without Ginette's devotion?"[9]

In 1923, Painlevé coauthored a paper on the color staining of glandular cells in chironomid larvae with Dr. Maurice Parat, one of his professors at the Sorbonne, and presented it to the Académie des sciences. It made headlines: "Twenty-Year-Old Son of Statesman Paul Painlevé, Youngest Researcher Ever

to Present a Paper to the Academy." (Painlevé was actually twenty-one at the time, but as he would later write: "Twenty sounded better.") A year later, he graduated from the Sorbonne with a degree in physics, chemistry, and biology.

OUTSIDE THE LAB: A PASSION FOR SPEED AND SURREALISM

Despite this early success, Painlevé chafed against what he viewed as academia's inherent elitism and stodginess. Rather, he became involved with Paris's flourishing avant-garde, which at the time was becoming increasingly dominated by the ideas and works of the Surrealists. Though Painlevé would never officially join any of the often contentious Surrealist factions, he befriended many of the movement's participants such as the brothers Jacques and Pierre Prévert and Painlevé's cousin Pierre Naville, who wrote the Surrealist text *The Queens of the Left Hand* and also worked as Leon Trotsky's secretary. In 1924, Painlevé, along with the German playwright and poet Ivan Goll, Guillaume Apollinaire, René Crevel, Pierre Reverdy, and others published the first and only issue of the review *Surréalisme*.[10] Goll, who served as editor, wrote in its manifesto: "Reality is at the root of all great art. Without it there is no substance. . . . Everything the artist creates originates in Nature." It was a belief that would later be reflected in Painlevé's own work. (In 1927, Painlevé would collaborate with Goll again, contributing filmed sequences to the staging of Goll's play *Methuselah*.)

Like his fellow companions of the avant-garde, Painlevé was fascinated by the new, the experimental, and seduced by speed. He became an ardent race car driver, acquiring a succession of cars: Bugatti, Salmson, Hupmobile, Lancia . . . In 1925, Painlevé entered the race Routes Pavées du Nord. Certain of victory at the wheel of his San Sebastien, he unfortunately lost—a fellow racer had sabotaged his car. This disappointment ended his driving career, and Painlevé turned his attention instead to the art of the moving image.

At this same time, in the mid-1920s, a new type of film was emerging: experimental shorts by artists rebelling against what they saw as the banality of commercial cinema. To accommodate these new films, ciné-clubs[11] were

enlarge
50% to
fit

Jean Painlevé in his Bugatti, 1925.

forming throughout France, screening such films as Fernand Léger's *Ballet mécanique*, René Clair's *Entr'acte* (featuring Man Ray, Eric Satie, Marcel Duchamp), and Luis Buñuel's *Un Chien andalou* and *L'Age d'or*.

It is through the ciné-club circuit that Painlevé would meet and form a deep friendship with the filmmaker Jean Vigo, who, before dying of tuberculosis at the age of twenty-nine, directed such renowned films as *Zéro de conduite* and *L'Atalante*. The son of a militant anarchist who died (some say was murdered) in prison, Vigo harbored a deep distrust for authority and believed cinema could play a role in political and social change, beliefs Painlevé shared. In response to Painlevé's program notes that accompanied a Paris screening of Vigo's *A propos de Nice*, a scathing satire about the wealthy inhabitants of the Riviera, Vigo writes to Painlevé: "What you have written for me has proved too heavy a joy for me to carry alone; I want you to grab a corner and help with the load." When Jean Vigo died on October 6, 1934, of a streptococcal infection, a complication of tuberculosis, Painlevé and Geneviève Hamon were at his bedside.

Jean Painlevé on his arrival to Nice photographed by Jean Vigo, 1932.

Jean Vigo on his deathbed, 1934.

The Unknown Woman of the Six-Day Race, 1926.

Painlevé's initial experience with film was not behind the camera, but in front. In 1926, Painlevé agreed to play a part in a feature film entitled *The Unknown Woman of the Six-Day Race* whose proceeds would help fund the Sorbonne Laboratory of Comparative Anatomy. On the set, Painlevé met a young actor named Michel Simon whom Painlevé would come to admire much and who, at the time, was just beginning his career appearing on stage in a Jean Cocteau play. (Eight years later, Simon would star in Jean Vigo's *L'Atalante*, having been introduced to Vigo by Painlevé.) *The Unknown Woman of the Six-Day Race* was never completed, but during the filming Painlevé became intrigued with the techniques used by the cameraman André Raymond. Raymond would achieve a time-lapse effect by disengaging the camera's crank, allowing only one frame per turn rather than the standard six-

Jean Painlevé and Michel Simon on the set of *The Unknown Woman of the Six-Day Race,* 1926.

André Raymond, 1928.

teen frames per second. This gave Painlevé the idea for his first film, *The Stickleback's Egg: From Fertilization to Hatching*. Raymond would go on to work with Painlevé both as cameraman and as invaluable mechanic in the construction of special technical devices needed for microcinema.

EARLY FILMS: STICKLEBACK EGGS AND OCTOPI

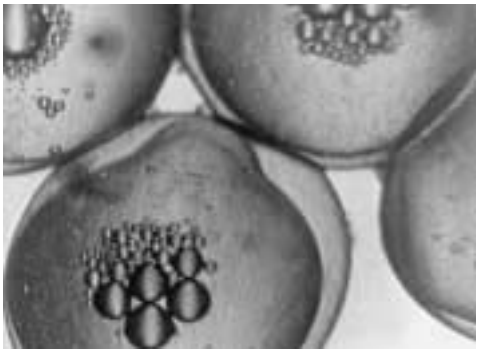
The Stickleback's Egg screened before an audience of scientists at the Académie des sciences in 1928 where it was met with intense skepticism, if not outrage. One scientist, infuriated, stormed out, declaring: "Cinema is not to be taken seriously!"[12]

This was not the first time film had entered the illustrious academy: in 1910, the French science filmmaker Dr. Jean Comandon had presented a film about the syphilis spirochete to a similar reaction. The prevailing attitude among scientists and academics was that cinema was frivolous, or, as the author Georges Duhamel put it, "entertainment for the ignorant."

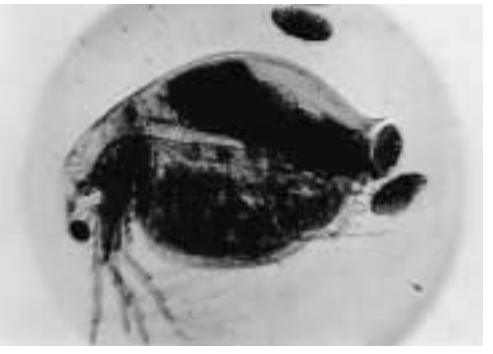
The reaction to Painlevé's film, however, only solidified his resolve. To promote the use of film in science, Painlevé cofounded the Association for Photographic and Cinematic Documentation in the Sciences in 1930 with Michel Servanne, head of the Musée Pédagogique, and Dr. Charles Claoué, a pioneer of plastic surgery who would later become famous for the "Claoué nose," a pert little pug sported by French celebrities such as actress Juliette Greco. Throughout the 1930s, the association held international conferences, screening such science films as *New Research on Amoebas*, *Operation on the Upper Palate*, *The Play of Productive Children*, and *Lymph Glands of the Frog*.

Scientists, though, were not the only ones skeptical of the legitimacy of science film. "How can we be sure that what we see on the screen is documentary truth?" asked a journalist. "When an actor is in front of the camera, he transforms himself, he modifies his behavior. . . . So, are we sure that the stickleback's egg itself is not disturbed, modified, or distorted by the camera and the lights?"[13]

Amid this atmosphere of distrust, Painlevé would later recount how he averted a potential disaster. While editing the original copy of *The*



The Stickleback's Egg, 1927.



The Daphnia, 1928.

The Hermit Crab, 1929.

Stickleback's Egg, Painlevé accidentally ignited the film with a cigarette. He hastily assembled a second copy for the screening at the academy but inadvertently put one of the sequences in backward. At the screening, Painlevé was not the only one to notice a perplexing phenomenon. Several specialists approached him asking to see the film again. Given the late hour, Painlevé was able to convince them to return the next day to view it. He immediately rushed home and quickly turned the sequence back around. The specialists never again saw the strange phenomenon of the heart rejecting the corpuscles instead of attracting them. Realizing the graveness of this error, Painlevé added, "Had I attributed this mistake to careless editing, and because cinema was already considered a sham, I think films would have been forbidden in labs and universities."[14]

Painlevé's precarious position within the scientific community would continue throughout his career. The French avant-garde, however, embraced his work from the very beginning. When Painlevé's study of skeleton shrimps and sea spiders, *Caprella and Pantopoda,* was screened in 1930 at the newly opened Les Miracles theater, Fernand Léger called it the most beautiful ballet he had ever seen, and Marc Chagall praised its "incomparable plastic wealth," calling it "genuine art, without fuss."[15] Man Ray borrowed footage of starfish from Painlevé to use in his own film *L'Etoile de mer*, and Georges Bataille published Painlevé's stills of crustaceans in his review *Documents*.[16]

Following *The Stickleback's Egg,* Painlevé began an intensely productive period, making a series of silent shorts on animal behavior for the general public. *The Octopus*, *The Daphnia*, and *The Sea Urchin* were shown at such theaters as the Studio des Ursulines and the Studio Diamant before the evening's feature. Eager for the feature, there were some in the audience who would boo; but there were others who were enthusiastic such as noted critic Elie Faure: "The science films of Jean Painlevé . . . in showing the dancing and glittering life of a mosquito, bring to mind the enchantment of Shakespeare and allow one to glimpse the exhilaration of the mathematician lost in the silent music of infinitesimal calculations. . . ."[17]

For his 1929 film *The Hermit Crab*, Painlevé for the first time added a musical accompaniment.[18] Through Robert Lyon, the owner of the prestigious concert venue Salle Pleyel, Painlevé met the composer Maurice Jaubert who provided a musical score for the film. Jaubert chose a composition by Vincenzo Bellini. Painlevé would later admit that he would have preferred a score written specifically for the film.

When Jean Vigo arrived in Paris in 1932 to shoot *Zero de conduite*—which would later be banned by the French Board of Censorship, presumably for its harsh portrayal of French bourgeois institutions—Painlevé introduced Vigo to Jaubert, who then composed the score for Vigo's film. For one of the scenes, Jaubert recorded the music normally, then played it backward, achieving a dreamlike effect.

Entranced with the result and pleased by his show of inventiveness, Painlevé asked Jaubert to compose an original score around which he would produce a film. Thus, *Blue Beard* was conceived. From Jaubert's thirteen-minute opera buffa, or comic opera, based on the tale of Blue Beard and his murdered wives, sculptor René Bertrand, aided by his wife and three young children, created hundreds of figurines out of clay that were then animated and filmed. With the use of a special camera—adapted by André Raymond from an old Pathé—each frame was shot three times using three different color filters and then developed according to the Gasparcolor method. *Blue Beard* would take three painstaking years to finish.

In 1938, at the first public screening of *Blue Beard*, Painlevé began his presentation by paying homage to Emile Cohl and Georges Méliès, inventors of animated film, who had both died that same year, largely forgotten.

Painlevé would often champion the work of others, paying particular attention to films that faced government censorship. One such film was Sergei Eisenstein's *Battleship Potemkin*, which chronicled the unsuccessful 1905 revolution against the Russian tsar. Viewed as Communist propaganda, the film was deemed "subversive" by European officials and censored. Thus, when Painlevé and his friend, the documentary filmmaker Joris Ivens, screened it in

René Bertrand on the set of *Blue Beard*, 1936.

René Bertrand's three young children modeling clay figurines for *Blue Beard*, 1936.

Amsterdam, they posted sentries at the theater door to watch for police. When the police did arrive, Painlevé and Ivens quickly stopped the projection, grabbed the film reels, and, with the audience in tow, scurried to another theater. There, too, the screening was interrupted by police. So the group moved again. In the course of one evening, the group moved six times, but in the end *Battleship Potemkin* was shown in its entirety.[19]

When Eisenstein himself came to Paris in 1930, Painlevé asked his father for help with the officials. Paul Painlevé ordered the head of the French police to leave the filmmaker alone. During the visit, Painlevé took Eisenstein on a grand tour of Paris: to Palais Royal square, to a café where poet Alfred de Musset reputedly sipped absinthe, to the Comédie-Française to ogle at the lavishly dressed crowd. "He enjoyed this classic bourgeois scene," Painlevé would later recall. "I also took him to the Cigale theater to see an exceptional American film *Red Christmas*. Afterward, we wandered around the Clichy fairgrounds . . . and had our photo taken in a mock airplane."[20] Painlevé also arranged for Eisenstein to travel secretly to Switzerland: "I had him hidden in a van of dirty laundry. He wanted to see Valeska Gert, a Swiss actress he adored."[21] When Eisenstein left Europe for the United States and Mexico, he wrote a series of postcards to Painlevé in which he chronicled his travels.

Jean Painlevé and Sergei Eisenstein at the Clichy fairgrounds, 1930.

THE SEAHORSE

In the early 1930s, when Painlevé set out to make one of the first films ever to use footage shot underwater, he chose as its subject the seahorse—a species with unusual, and to Painlevé, commendable sex roles: whereas it is the female seahorse who produces the eggs, it is the male who gives birth to them. "The seahorse," he would later write, "was for me a splendid way of promoting the kindness and virtue of the father while at the same time underlining the necessity of the mother. In other words, I wanted to re-establish the balance between male and female."[22]

To film underwater, Painlevé enclosed a Sept camera—given to him by Charles David, the head of production at the Pathé-Natan studio—in a specially designed waterproof box fitted with a glass plate for the camera's lens to peek through. The filming, which took place in the Bay of Arcachon, was ardu-

Jean Painlevé with Sept camera and Fernez mask during the filming of *The Seahorse* in the Bay of Arcachon, 1933.

Young seahorse, 1933.

enlarge
45%

Jean Painlevé in his basement studio, Paris, 1933.

ous. The camera could hold only a few seconds of films, causing Painlevé to return to the surface continually to reload. Moreover, the diving equipment he used was crude, so his movements were limited. Essentially tethered to a boat, his breathing apparatus was connected, by a ten-meter-long hose, to a manually operated air pump located above water. Painlevé would later recall the difficulties: "The goggles were pressing against my eyes, which, at a given depth, triggers an acceleration of the heart by oculo-cardiac reflex. But what bothered me most was that at one point I was no longer getting any air. I rose hurriedly to the surface only to find the two seamen quarreling over the pace at which the wheel should be turned."[23]

The filming continued in Paris in a basement studio outfitted with immense seawater aquariums. There, Painlevé and André Raymond set up a camera and waited patiently for one of the seahorses to give birth. At first Painlevé manned the camera, but after several days of no sleep, he asked Raymond to fill in for a few hours. Raymond fell asleep. So Painlevé took over again—but not before installing a device on the visor of his hat that would emit a small electrical shock if, from fatigue, his head should nod onto the camera. Painlevé was thus able to film the birth.

Financed in part by a personal loan from Bernard Natan, who then distributed it through the Pathé-Consortium, *The Seahorse* was a popular success—the first and only of Painlevé's films to break even. Indeed, so popular was the film that Painlevé launched a line of seahorse jewelry: gilded bracelets, necklaces, pins, and earrings that were designed by Geneviève Hamon, sold under the label "JHP" (for Jean Hippocampe Painlevé) and displayed in chic boutiques alongside aquariums filled with live seahorses. Promotional photographs were shot by Philippe Halsman, the Lithuanian-born photographer whose work is collected today in such books as *Dali's Moustache* and *The Jump Book*.[24]

The jewelry venture proved to be very profitable—but Painlevé never saw any of the money. Uninterested in running the business, he had taken on a partner, Clément Nauny, to manage the manufacturing end of the operation.

reshoot-
this was
cropped

Promotional postcard for Hippocampe jewelry, 1936. Photo: Philippe Halsman.

Hippocampe boutique in Printemps department store, 1936.

At the end of the war, Nauny made off with the profits and absconded to Monaco where he was never heard from again.

CLUB DES SOUS-L'EAU

In 1933 Yves Le Prieur, a French navy captain and inventor of the transparent screen called the "transflex" (which was used in filming the special effects for *King Kong)*, demonstrated his newest invention: a self-contained underwater breathing apparatus that combined a high-pressure air tank with a specially designed demand valve. Le Prieur's model—a vast improvement over earlier attempts—allowed a diver to receive air simply by opening the valve. Thus, a diver's mobility was no longer restricted by external hoses and air pumps.

Painlevé was delighted. "What was wonderful about Le Prieur's solution," he would later write, "was that the general mask dispensed—albeit with a lot of wasted air—with the need to wear goggles."[25] And with the recent introduction of swim fins—or "swimming propellers" as their inventor Louis de Corlieu called them—a diver "was free to come and go."

Two years later, Painlevé and Le Prieur founded a diving club, reputedly the first such club in the world. For its name, Painlevé came up with a pun: *sous-l'eau,* which when pronounced can mean both "underwater" and "drunkard." (Later, however, in anticipation of a visit by the minister of the Navy, François Piétri, who was known to have a particular fondness for the alcohol suze, club members voted to change the club's name to the more respectable-sounding "Club of Divers and Underwater Life." The only dissenting vote was cast by Painlevé.)

With roughly fifty members, the club met at Le Prieur's home in Saint Raphaël on the Mediterranean, where it practiced diving techniques, and at the Pontoise swimming pool in Paris, where it held spirited galas. At one such gala, dancers equipped with electric torches performed an underwater ballet to music by Emmanuel de Falla, a man rode a bicycle underwater, six-year-old Micheline Merle—the world's youngest diver—was celebrated, and everything was recorded by Philippe Halsman's camera.

Jean Painlevé with Debrie camera in waterproof box and Le Prieur breathing apparatus, Saint Raphaël, 1936.

Jean Painlevé and Captain Yves Le Prieur, Saint Raphaël, 1936.

Louis de Corlieu, inventor of "swimming propellers," 1930.

For Painlevé, Le Prieur's new diving apparatus seemed to offer an entrance into a kind of utopia of underwater living. Indeed, he dreamed of one day creating a studio—complete with film equipment, scientific apparatus, and technicians—entirely underwater. It would be a place where one could move about freely "with confidence and ease in this new night, patiently on the lookout for its dramas."[26] But as the political situation in Europe grew grimmer, Painlevé became estranged from the diving club—and from the right-wing Le Prieur. The French military quickly adopted Le Prieur's diving equipment, using it for purposes that had nothing to do with underwater studios.

Meeting of the Club des sous-l'eau, Saint Raphaël, 1936.

Underwater bicyclist in the Pontoise swimming pool, Paris, 1936. Photo: Philippe Halsman.

FIGHTING FASCISM

Though Painlevé never officially joined any political party, during the years leading up to World War II, he supported the Common Front: a coalition of communists, socialists, workers' unions, and leftist intellectuals fighting against fascism, and a forerunner of the 1936 Popular Front. In 1934, Painlevé traveled to Austria with the World Committee Against War and Fascism[27] to investigate the bombings of working-class housing districts. Two years later, he traveled to Poland with members of numerous organizations including the World League of Human Rights and Friends of the Polish Nation to report on the conditions of Berezasa-Kartowska, an internment camp for political prisoners. This mission, however, was a failure: Painlevé's group was thrown out when it attempted to speak with the prisoners. (Eleven years earlier, Painlevé's father had expelled a diplomat from the Polish Embassy in Paris on charges of espionage. At the time of Painlevé's fact-finding mission, that same diplomat, Edward Smigly-Rydz, had risen to "first citizen after the president" and marshal of Poland, a situation that may help explain the hostile reception Painlevé's group received at Berezasa-Kartowska.)

Back home, Painlevé joined actor Jean Gabin to create the French Cinema Committee for Helping Children. Financed by a group of French cinema's most prominent names—director René Clair and actor Michel Simon among them[28]—the committee created a homeless children's shelter in Andernos, near Arcachon. "After the war I went to Andernos to obtain news of the children—but in vain," Painlevé would later write. "They had been given over to the Germans against our will."[29]

By 1938, laws governing foreigners living in France had become increasingly restrictive. In response, Painlevé became secretary general of Friends of the French Republic, a nonprofit organization that helped immigrants—many of whom were fleeing fascism—obtain French citizenship or work visas. In July 1938, Painlevé wrote to the foreign ministry on behalf of Lithuanian-born Halsman and the Romanian-born animal photographer Ylla (Kamila Koffler).[30] But with the war approaching, it became clear that French officials could not be

Simplifilm still by A. P. Dufour, circa 1939.

relied upon to provide the necessary documents for foreign residents to remain safely in France. Thus, Halsman and Ylla chose to emigrate to the United States.

For Painlevé, supporting artists and scientists was ultimately a political act: he believed the very soul of a country depended on them. "Without free thinking," he wrote during this time, "no progress is possible. Governments may be able to fabricate statistics about agricultural or industrial production, but they cannot invent literature, art, or science."[31]

In between his political activities, Painlevé continued to make films, producing a series on mathematics and astronomy including *The Fourth Dimension*, *Voyage through the Sky*, and *Similarities between Distance and Speed* that screened at the Universal Exhibition in Paris in 1937. In making these films, he collaborated with Achilles Pierre Dufour, the inventor of Simplifilm, a special effects technique that superimposes one image over another in the same exposure. According to Painlevé, A. P. Dufour was "the best special effects engineer in cinema."

WAR AND VAMPIRES

In 1938, the Pasteur Institute in Paris invited Painlevé to film some recently acquired exotic animals. Among them was *Desmodus rotundus*, or the Brazilian vampire bat, so named for its habit of feeding on the blood of other animals. Painlevé was transfixed, seeing in this small creature affinities with what was often referred to as "the brown pest"—Nazism.

"Unlike other bats who only fly and suspend themselves, this vampire bat walked like a cripple, leaning on the end of its bent forefeet," Painlevé would later explain. "When I was finishing the film, I noticed how the vampire bat extends its wing before going to sleep. I thought it looked like the Nazi 'Heil-Hitler' salute."[32]

On September 1, 1939, the German army invaded Poland. In response, Britain and France immediately declared war. Nine months later, German troops arrived in Paris, flying swastikas from its historical buildings. France surrendered (though a Free French force, led by Charles de Gaulle, continued to fight in exile), and for the next four years, France was controlled by the collaborationist Vichy government set up by Philippe Pétain.

Painlevé went into hiding, fleeing to Collioure on the southern tip of France, then crossing over to Spain during the night using his Le Prieur diving gear. For the remainder of the war, Painlevé stayed in various locations in the south of France. (On the day the German troops arrived in Paris, the Gestapo went in search of Painlevé, inquiring about him at one of the boutiques selling his seahorse jewelry. The saleswoman told them he had already left Paris. Years later, Painlevé would wonder if the Gestapo's interest in him was due to his yet-to-be-completed film *The Vampire*.)

Although Painlevé did not make a film for the duration of the war, he maintained ties with the science and film communities, making clandestine visits to Paris and Nice. In 1941, during one of his visits to Nice, Painlevé met with filmmaker Jean Lods, film critic Leon Moussinac, and filmmakers Maurice Cloche and Marcel L'Herbier to create the Artistic and Technical Center for Young Filmmakers (CATJC), known after the war as the Institute for Advanced Film Studies (IDHEC), a film school and, the founders hoped, a way for young

people to avoid being sent to Germany for obligatory work. Later, however, Painlevé would distance himself from the IDHEC, claiming it had turned into a diploma mill.

During his visits to Paris, Painlevé would stay with Dr. Charles Clauoé or with the brother of filmmaker Georges Franju. On one of these visits, Painlevé met with the secretary of the Paris unions Henri Raynaud, known as "Riri," and filmmaker Jean-Paul Dreyfus, alias Le Chanois, and together they formed the Committee for the Liberation of French Cinema (CLCF), hoping that one day it would replace the Committee for the Organization of the Cinema Industry (COIC), created by the Vichy government.

LIBERATION

In August 1944, on the eve of the Liberation, Painlevé was celebrating with members of the CLCF, drinking champagne stolen from the secret stash of a pro-German member of the COIC. Over the radio they heard General Charles de Gaulle's official pronouncement: "Paris, Paris, freed!" The CLCF had already appointed Painlevé director of French cinema and would go on to impose their decision on the provisional government. Painlevé was sworn in on August 20, 1944.

Though film production resumed in December 1944, the French film industry was in shambles. "The difficulties facing the industry are immense," he wrote at the time. "As soon as we are ensured electricity and lighting, we run out of coal. As soon as we get coal, we run out of film stock. . . ."[33] (Painlevé was successful in securing film stock for Robert Bresson to finish his film *Les Dames du bois de Boulogne* and for Georges Rouquier to shoot *Farrebique*, which was composed of seventeen different kinds of film.)

During his nine-month tenure as director of cinema, Painlevé initiated several reforms. He created the Superior Technical Committee (CST), whose task was to promote new and more efficient film production techniques, and the Federation of Spectators, whose aim was to increase audience numbers. Along with a group of filmmakers from the CLCF, he also created a newsreel service, France Libre Actualités (later known as Actualités françaises), hoping

it would protect French cinema from foreign monopolies and from the newly elected president de Gaulle's seeming desire to control all information.

In May 1945, de Gaulle dismissed Painlevé by decree, replacing him with a civil servant who, unlike Painlevé, had never worked in cinema. The reaction to Painlevé's dismissal was immediate: members of the film, radio, and theater communities held a one-day general strike in protest.

Although Painlevé was finished with public office, he was hardly finished in the public arena. In 1947, Painlevé was named president of the French Federation of Ciné-Clubs where he promoted the interests of the rapidly growing number of ciné-clubs that had formed after the war.

Painlevé also revived the Institute of Scientific Cinema (ICS), a nonprofit organization he had founded in 1930 to ensure the distribution of science films. In 1945, Painlevé appointed Georges Franju, cofounder of the Cinémathèque française, secretary general of the ICS. Franju was a fledging filmmaker at the time and regarded by Painlevé as a brilliant film curator. The two would collaborate on Franju's *Blood of the Beasts*, a documentary short on a municipal slaughterhouse on the outskirts of Paris for which Painlevé wrote the narration. Franju would go on to become a renowned director of such feature films as the celebrated *Eyes without a Face*.

Jean Painlevé as director of French cinema, 1944.

John Madison, Georges Franju, and Jean Painlevé, Paris, 1948.

In 1946, the ICS held its first conference, a three-day event at the Palais de Chaillot in Paris, screening thirty-eight science films from around the world. Among the eclectic fare was *Predatory Mushrooms* from France, *Insects in Vegetables* from Canada, *Solar Eclipse* from China, and *Principles of Air Navigation* from America's Walt Disney Studios.

A year later, at the next ICS conference, the International Association of Science Films (AICS) was officially created. The AICS, until ceasing its activities in 1992, held international conferences where hundreds of films from all over the world were screened. Painlevé was its president and John Madison, a British writer specializing in science film, served as vice-president. Made up of scientists and filmmakers from twenty countries, the AICS was divided into three groups, each concentrating on a different kind of science film: research, educational, or popular. From the beginning, however, there was conflict. Indeed, much of the AICS meetings was spent trying to define just what a "science film" was. "Some swore by pure research only," Painlevé would write of these debates, "and thought that to make a popular film was to prostitute oneself. . . . The discussions were endless, hours and hours spent quibbling and splitting hairs. . . ."[34] (During the following conference, which was held in London, Painlevé and Madison escaped these migrainous meetings and head-

John Madison and Jean Painlevé at the Pleasure Gardens, London, 1948.

ed instead to the nearby Pleasure Gardens, an amusement park with attractions made by sculptors, painters, and designers. "Instead of attending the conference, I spent all my time in the Pleasure Gardens. I took Madison along. We had our photo taken. . . dressed as cabaret dancers. . . . The president and vice-president in drag.")[35]

Another point of contention was the inclusion of communist countries in the AICS. The Canadian representative went so far as to accuse the AICS itself of being a Bolshevik enterprise and threatened to quit—an accusation Painlevé found absurd. "The AICS was obviously no Bolshevik enterprise," he later wrote. "The majority of members were from the West. The rest had no interest in taking over, even if they did have a different point of view. . . ."[36]

Such disagreements, caused by mounting Cold War tensions, would ultimately infuse another organization, the World Union of Documentary Filmmakers, which was created in Brussels in 1947 by Henri Langlois, the head of the Cinémathèque française. Early on, the British filmmaker John Grierson wanted to exclude a group of Eastern European filmmakers. Painlevé and Joris Ivens vigorously disagreed, arguing that the union should be open to all filmmakers, no matter what their political beliefs. Unfortunately this disagreement proved fatal, and the union disbanded shortly after. The participants

World Union of Documentary Filmmakers, Brussels, 1947.

Jean Painlevé at the Shanghai science film studio, 1956.

were, however, able to agree on one point of business: a definitive definition of *documentary*: "Any film that documents real phenomena or their honest and justified reconstruction in order to consciously increase human knowledge through rational or emotional means and to expose problems and offer solutions from an economic, social, or cultural point of view." It was a definition that Painlevé would champion in his later writings.[37]

In addition to these official conferences, Painlevé also organized his own numerous film programs over the years such as "Poets of the Documentary" and "Nature Revealed by Cinema," with which he toured the French provinces, Switzerland, North Africa, Eastern Europe, South America, China, and Scandinavia.

Painlevé resumed his own filmmaking in 1946 with *Freshwater Assassins*, a film depicting the violent habits of subaquatic pond life. French historian Georges Sadoul called the film "ferocious" and, pointing to the film's graphic scenes of invertebrates brutally devouring each other, deemed it a powerful metaphor for the six years of war the world had just endured.[38]

THE ADVENT OF TELEVISION

"Soon cinema will die," wrote Painlevé in 1945 in an article celebrating the fiftieth anniversary of cinema. "Its grandchildren will use electromagnetic tape instead of film, color television screens with cathode-ray tubes instead of projector bulbs. . . . In short, they will be beautiful grandchildren. Let's just hope they'll continue to provide what the best of cinema does: a synthesis of art, science, and poetry."[39]

Painlevé had been interested in the new medium of television from the very beginning. In 1933 he told the *New York Herald:* "Television is the key discovery that can revolutionize motion pictures."[40] Six years later, Painlevé and a group of associates formed a short-lived television broadcast company, the Association for Worldwide Radio-Television Broadcasts (ARTEM). ARTEM had contracts with, among others, Maurice Chevalier and Edith Piaf. ARTEM, though, had a less than auspicious beginning. An American company had bought from ARTEM the exclusive rights to footage of the first air raid on Paris.

The air raid was recorded directly from the window of their rue Lincoln offices, but the sound quality was, as Painlevé put it, "pitiful." He would go on to explain: "Instead of doing what anyone in his right mind would have done, which is to add sound effects using paper bags to imitate the explosions, we sent the footage as it was to the US. The soundtrack sounded like someone emitting ridiculous little farts."[41] After the war, the government nationalized television, eliminating any possibility for a private station.

On June 19, 1948, Painlevé became the first person in France to broadcast a live science program on television. In this hour-long program, Painlevé demonstrated, by connecting a camera to a microscope, the teeming life contained in a single drop of water. So new was this technique that studio technicians feared the light from Painlevé's microscope would ruin the camera tubes. Painlevé had to convince them otherwise. A month later, for the BBC in London, he repeated the program, which he called "Under the Microscope," and again he had difficulties with the studio technicians. Unable to speak English, and becoming increasingly frustrated, Painlevé finally exclaimed, "Et puis, merde!" Only later would he realize this obscenity was instantly broadcast into the homes of 200,000 British television viewers. In subsequent television programs, Painlevé continued to bring yet unseen worlds to television viewers such as a live exploration of the human body's interior in the 1956 French Public Television program "Live Endoscopy."

COLORED URCHINS AND A RETURN TO ROSCOFF

In 1954, Painlevé made his first color film, a remake of his 1929 film *The Sea Urchin*, calling his new version *Sea Urchins*. To show what lay inside the sea urchin's prickly exoskeleton, Painlevé used a technique devised by a lab assistant at the Musée d'Histoire Naturelle in Paris: liquid gelatin was injected into the sea urchin, and once the gelatin solidified, the sea urchin's shell was carefully broken and removed, and the sea urchin's intricate inner workings, protected by a layer of transparent gelatin, were suddenly and dramatically made visible. For the film's score, Painlevé recorded a group of young people play-

ing pots and pans, dubbing it "organized noise," in homage to his friend Edgard Varèse, the French avant-garde composer. And, as he would later write, "so as not to be taken too seriously," he added a few bars of "The Real Mambo."

For the filming of *Sea Urchins*, Painlevé took on a young cameraman named Claude Beausoleil. As Painlevé would often do with newcomers, he put Beausoleil through a test: loaded with equipment, Beausoleil had to cross a waist-deep waterway rich with octopuses. Up for the challenge, Beausoleil traversed the waterway, arriving on the other side smiling, an octopus wrapped around his leg. (Five years later, as one of Jean-Luc Godard's cameramen, Beusoleil would use a Cameflex camera with a shoulder harness specially designed by Geneviève Hamon that eliminated the need for a tripod, affording the cameraman the mobility to follow his subject. Painlevé loaned this camera apparatus to Godard to use in the shooting of *Breathless*.)

With the completion of *Sea Urchins*, Painlevé embarked on a period of intense production, making such films for popular audiences as *Sea Ballerinas*, *Shrimp Stories*, and the eerily beautiful *Love Life of the Octopus*. When asked how he achieved the chilling effect of the narrator's voice in *The Love Life of the Octopus*, Painlevé explained: "He was an old man who, out of vanity, refused to wear glasses. He was therefore obliged to stick his face right up against the script, close to the microphone, where one could hear his emphysema."[42]

During this same period, Painlevé became the official filmmaker at the Roscoff Marine Biology Station, where he collaborated with a number of researchers making films primarily for a scientific audience. He made, among others, a film documenting Luc Montagnier's work on chloroplast phototaxis; a film on shrimp parasites with shrimp specialist Catherine Tchernigovtzeff; and a film on teredos, or shipworms, with scientist Alexander Cantacuzène. (Painlevé greatly admired his father, Jean Cantacuzène, for his 1923 discovery of electrophoresis[43] in what is known as the peanut worm.)

Painlevé regarded most of the films he shot at Roscoff as too technical for a general audience. One of them, however, he saw differently. In 1972,

Geneviève Hamon, 1950.

Jean Painlevé with Cameflex camera and shoulder harness, circa 1955.

Painlevé was asked by Yves Bouligand to document the phenomenon of liquid crystals found in such substances as acetic acid, caffeine, and urea. The molecular structure of these liquid crystals is particularly sensitive to changes in temperature and pressure, which in turn cause changes in the crystals' orientation and color. Observing them under polarized light reveals the continual transformation of the crystals' form and colors that slowly change from the deepest black to the most vibrant of colors. Fascinated, Painlevé reedited the original version to create a short film for a general audience. For the soundtrack to *Liquid Crystals*, he dug out a score given to him by a young composer named François de Roubaix who had since died in a diving accident. When Roubaix's composition "Antarctica" fit perfectly, Painlevé called it "a cosmic coincidence."

In the mid-1970s, Painlevé began experimenting with new techniques in video. For one such experiment, he superimposed two images that were identical except for a slight time lag between their electronic signals. The produced effect was akin to a three-dimensional image. Though he originally applied this technique to his scientific work, using it to record transparent microorganisms that live on marine plankton, he also used it to take portraits of his friends, colleagues, and himself, calling the results "Scrutinize Yourself."

PIGEONS OF THE SQUARE

In 1970, Painlevé underwent his first hip replacement surgery; ten years later, "to make sure he was intent on living," he underwent a second. Then finally, to relieve the incessant pain and make walking easier, he had an operation on his lumbar vertebrae. The procedure relieved the pain, but he was never able to walk unaided again.

In 1982, from a hospital bed that had been equipped with an editing table, Painlevé finished his final film, *Pigeons of the Square*. The film shows Painlevé sitting on a park bench in Batinolles square, gently explaining the attributes of the common pigeon to a group of young children—an example of "school without walls," Painlevé's preferred method of learning. The film con-

Liquid Crystals, 1978.

"Scrutinize Yourself," 1978.

Jean Painlevé, 1979.

cludes with an homage to Etienne-Jules Marey, who in 1882 invented the photographic gun for his studies of bird flight. Thus, Painlevé's last film can be seen as a tribute both to the past, by way of Marey, and to the future, by way of the smiling children standing before him.

Painlevé spent his final years writing prolifically on his old Remington typewriter. He completed an account of his hospital experiences and a collection of eighty short semiautobiographical stories that he entitled "Theater of Derision." On July 2, 1989, Jean Painlevé died. He was eighty-six years old.

Jean Painlevé's legacy will remain connected to the grace and vivacity of his most familiar symbol, the seahorse, who as "a victim of contradictory forces, suggests that it has disguised itself to escape, and in warding off the fiercest fates, it carries away the most diverse and unexpected possibilities."

This is the way Painlevé described his star in 1934. In many ways, he was describing himself.

Notes

1. "Jean Painlevé Reveals the Invisible," interview by Hélène Hazéra and Dominique Leglu, *Libération* (15–16 November 1986).
2. Reproduced in *Paroles et écrits de Paul Painlevé* (Paris: Editions Rieder, 1936).
3. Captain Alfred Dreyfus, an Alsatian Jew, was wrongly convicted of treason and sentenced to life imprisonment amid an extreme atmosphere of anti-Semitism. Although it was revealed that much of the evidence against Dreyfus had been forged by a colonel in army intelligence, the military court was unwilling to admit error.
4. Jean Painlevé, unpublished.
5. Jean Painlevé carried a banner that read "Free Abd el-Krim," a Moroccan nationalist imprisoned by the French authorities during the War of the Rif, 1926.
6. Jean Painlevé, unpublished.
7. A game popular with the Surrealists where players would each contribute words to a piece of paper folded to conceal the preceding contributions, producing a sentence of humorous conjunctions.
8. Jean Painlevé, unpublished.
9. Catherine Tchernigovtzeff, research scientist.
10. Painlevé's contributions included "An Example of Surrealism: The Cinema" and "Neo-Zoological Drama."
11. Organized by the filmmakers themselves, these ciné-clubs provided an informal network through which to circulate their films.
12. Jean Painlevé, unpublished.
13. *Le Vingtième siècle* (23 December 1932).
14. Jean Painlevé, unpublished.
15. Both Fernand Léger and Marc Chagall were quoted in the newspaper *L'Intransigeant* (23 December 1930).
16. Painlevé's stills and photographs were published in numerous magazines including *Jazz*, *Vu*, *Voilà*, and *Art et médicine*.
17. Elie Faure, *De la cinéplastique* (Paris: Ed Séguier, 1995).
18. Although *The Hermit Crab* was Painlevé's first sound film, in addition to the spoken narration he continued to use intertitles. In his 1931 essay "On Maintaining Intertitles in Sound Documentaries," Painlevé explains, "In the documentary, the intertitle is a pause, a repose . . . allowing for the clarification of the mind. . . ."
19. Jean Painlevé, unpublished.
20. Jean Painlevé, unpublished.
21. Jean Painlevé, unpublished.
22. Jean Painlevé, unpublished.
23. Jean Painlevé, unpublished.

24. Painlevé played an instrumental role in Halsman's early career, giving the then-struggling photographer a Kodak 9 x 12—the finest camera available at the time—when Halsman first arrived in Paris in 1931. The two became lifelong friends.
25. Jean Painlevé, unpublished.
26. Jean Painlevé, unpublished.
27. Created by Henri Barbusse, the committee was headed by Paul Langevin, André Malraux, Jean Longuet, Sir Norman Angell, Heinrich Mann, H. F. Ward, Sherwood Anderson, John Dos Passos, and A. A. Macleod.
28. Other members included Marc Allégret, Jean-Louis Barrault, Jean Benoit-Lévy, Raymond Bernard, Pierre Braunberger, Germaine Dulac, Julien Duvivier, Edwige Feuillère, Armand Moss, the Prévert brothers, and Pierre-Richard Willm.
29. Jean Painlevé, unpublished.
30. Painlevé first met Ylla in the early 1930s after seeing her photographs at a cat show. Instantly struck by "the force and the absence of sentimentality" of her animal portraits, he sought her out at her studio and bought a number of prints. He used one of them, a portrait of a pigeon, in his last film, *Pigeons of the Square*, as a tribute to Ylla who died in 1954 after falling from a jeep while photographing a bull race in Barathpur, India.
31. Jean Painlevé, "Intellectuals and Fascism," 1936.
32. Jean Painlevé, unpublished.
33. Jean Painlevé, unpublished.
34. Jean Painlevé, unpublished.
35. Jean Painlevé, unpublished.
36. Jean Painlevé, unpublished.
37. Jean Painlevé, " Castration du documentaire," *Les Cahiers du cinéma* (March 1953).
38. Georges Sadoul, "Jean Painlevé et les ciné-clubs," *L'Ecran français* (10 July 1947).
39. Jean Painlevé, "La Place des français dans le cinéma," *Cinquantenaire du cinéma* (28 December 1945).
40. "Television, Films' Sole Hope, Painlevé's Son, Pioneer, Holds," *New York Herald* (Paris), 26 October 1933.
41. Jean Painlevé, unpublished.
42. Jean Painlevé, unpublished.
43. A process in which microbes are attracted by electricity produced by an organism.

FLUID MECHANICS

Ralph Rugoff

Nature films tend to be straightforward affairs, offering a bird's-eye view, as it were, into a given creature's basic behaviors, and providing a compact package of sex and death that seems utterly natural. Rarely do they lead us to question our ideas about how we view other species, let alone humanity itself, nor do they regularly challenge our aesthetic assumptions. But in chronicling the habits of vampire bats, hermaphrodite mollusks, and fashion-conscious crustaceans, the pioneering films of Jean Painlevé do precisely this, and in the process they prompt us to reconsider not only the role of imagination in science documentaries, but our strange devotion to inflexible categories of all kinds.

The films that Painlevé made for popular audiences (as opposed to his strictly scientific works) are an unsettling mix, slyly shifting tone and emphasis. Starting from clinical matter-of-factness, they seamlessly move to poetically charged whimsy and macabre perversity. They can be droll as well as ghoulish, dreamlike as well as harrowingly detailed. Painlevé's cinematography is also extraordinarily beautiful, boasting images so elegantly composed and strikingly lit that they seem more appropriate to art films than to documentaries and lend his films an aesthetic self-consciousness that vies with their apparent educational function. At the same time, the films are punctuated by moments of disarmingly deadpan humor: during a sequence showing the surreal spectacle of mating octopi, the narrator relates that the male aims to insert his "special arm" into the female's respiratory opening, then adds, "There is no recommended position to achieve this."

Painlevé's cinema can instill unease and wonder in equal parts. Indeed, his approach to filmmaking sometimes seems like an adventure in the aesthetics of uncanniness. Not that Painlevé was a director of horror movies (though you could argue as much), but his approach often engenders a discomforting intellectual uncertainty—which is one definition of the uncanny. Freud, among others, suggested that this uncertainty revolves around a question of familiarity: we experience the uncanny when faced with the normal rendered suspicious, the familiar made unfamiliar—of which a prime, but by

no means exclusive, example is being unsure about whether something is dead or alive. In the case of Painlevé's films, it is our familiar concept of the "human," along with an arsenal of related categories, that can suddenly appear alien or even suspect, leaving us with a haunting sense of our own strangeness even as we gape in wonder at nature's bizarre marvels.

Through his imagery, narration, and use of music, Painlevé delights in presenting his subjects as uncanny hybrids that, for all their foreignness, call to mind things close to home. Sometimes this tendency is evident in the creatures he chooses to film: the seahorse, with its vertical posture (unique among aquatic vertebrates), is bound to conjure bipeds, and in *The Seahorse*, Painlevé's narration playfully pushes the point by describing its "slightly affected air of dignity," or the way its pouting lower lip "gives it a slightly embarrassed air, transformed into anxiety by the highly mobile eyes." In another filmic portrait, the vampire bat is introduced after an extended commentary on its myriad human and mythological attributes. Even the octopus, "creature of horror," is pointedly rendered with a recognizable detail: the narrator of *The Love Life of the Octopus* informs us that "this simple mollusk's eye, like those of the higher animals, boasts folds serving in the guise of eyelids." No wonder that sleepy expression looks so uncannily familiar!

Painlevé's playful use of hybrid images extends beyond this kind of ironic anthropomorphism. His film on Pantopoda prompts viewers to wonder whether these eight-legged creatures are crustaceans or spiders, and in his stylish meditation *Hyas and Stenorhynchus*, he shows us clumps of walking underwater vegetables, which turn out to be crabs enjoying a fashionable promenade in seaweed camouflage. That ultimate hybrid, the hermaphrodite, is celebrated in *Acera or The Witches' Dance*, with its scenes of mollusk sex chains in which the middle creatures in a given row of fornicators function as both male and female.

Ultimately, however, the anthropomorphic proves to be Painlevé's most fertile playing ground. Yet his anthropomorphism is hardly in the vein developed much later by Walt Disney's "live action" nature films, which continued a long literary and mythological tradition of projecting human values and

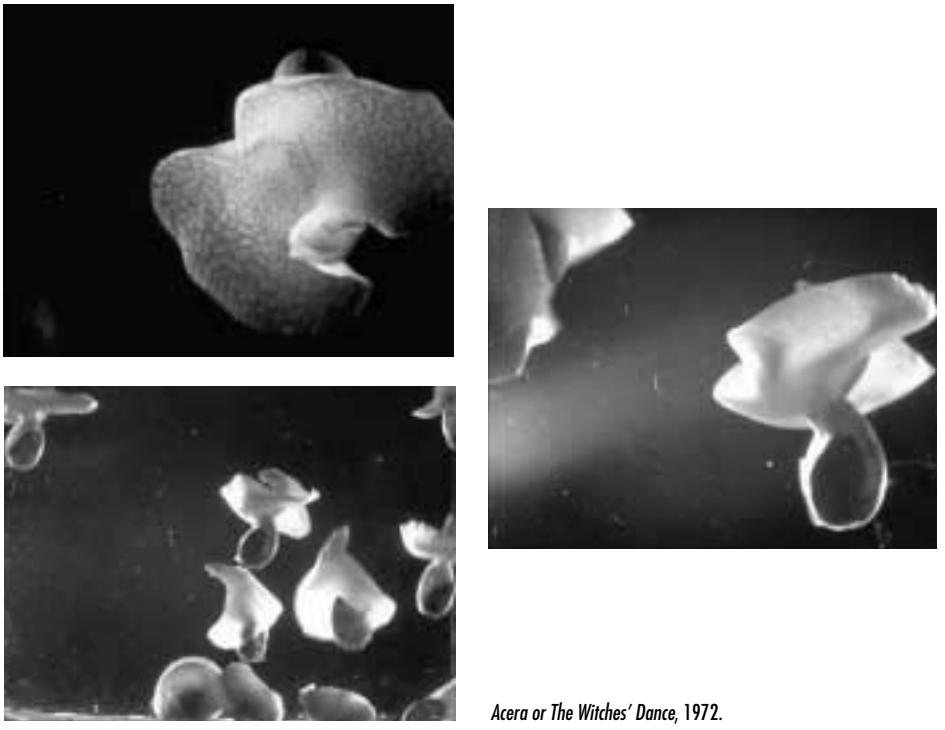
emotions onto cuddly critters. To the contrary, in Painlevé's hands it is a tool that subverts the narcissistic self-portrait we so readily impose on our animal friends. Often as not, like a mirror, his films hold up to us seemingly familiar grotesqueries such as the vampire bat's peaked snout, ceaselessly quivering in the throes of a lascivious frenzy, as if to say, "Identify with that!"

Though Painlevé mischievously calls our attention to minor similarities of appearance between certain creatures and humans, his films are much more deeply engaged with studying what the narrator of one film calls the "grace and terror of gestures." Among these are "gestures" that we can hardly resist reading in human terms: seahorses, for instance, linking their tails as if holding hands, or the vampire bat bestowing its deadly kiss on a hapless guinea pig, which it slyly approaches like a coquettish Quasimoto. On one level, moments such as these seem to function in the films mainly as amusing interludes breaking up the dry scientific accounts of an animal's biology, but they also serve to create an uncanny effect as they prompt us to try to reconcile the irreconcilable: the utterly strange appearance of such creatures with our own familiar mannerisms. Consequently, Painlevé's films often proceed according to an alternating rhythm of seduction and repulsion as we are invited to identify with a particular aspect of a given creature, only to have it revealed a moment later just how monstrously different this other life form actually is.

Far more commonly, though, we are asked to focus on movements that seem less familiar. From the convulsive throes of a male seahorse in labor to the sixteen tentacles of mating octopi whooshing within gravity-free grace or the gently unfolding fanlike "caress" of the spirograph, Painlevé's films feature a fabulous litany of jerking, thrusting, jittering, twittering, flopping, flapping, floating, swishing, limping, wiggling, jiggling, pulsing, and convulsing organisms and organs. The flowing ease made possible underwater gives many of these movements a balletlike grace, and they appeal to the delight we take in watching movement of all kinds—a facility evident in infants as well as in those elderly people one sees in older urban neighborhoods leaning out of tenement windows to watch the hustle and bustle below.

Painlevé's films often accentuate the dancelike spectacle of underwater motion through the use of orchestral soundtracks, which are often loosely synched-up with the subjects' rhythmic actions. A scene in *Acera or The Witches' Dance* rivals anything in *Fantasia*: accompanied by a Pierre Jansen score, mollusks rise and fall in the water in a choreography of weightlessness, resembling flying mushrooms as their cloaks flap up and down their pear-shaped bodies. *Freshwater Assassins* features a more frenetic style of dance, as tiny transparent carnivores (dragonflies, planorbids, and hydrophilic beetles) engage in ferocious orgies of violence, pulsating to a hot jazz soundtrack featuring tunes by Louis Armstrong and Duke Ellington, among others. Inevitably their rhythmic thrashing conjures a mad nightclub scene, and we are prompted to wonder whether our urbane pastimes are as exclusively human as we tend to assume (indeed, when the narrator of *Acera or The Witches' Dance* remarks of his subjects that "as with other animals, dance is a way to find a partner," the entire Western nightclub scene starts to seem like a mollusk throwback).

In general, movement takes on an uncanny quality when it provokes confusion regarding the character of its source—such as the jerky, rusty twitches of a zombie in a horror movie, that stiff Frankenstein choreography designed to alert us to a creature's "unnatural" place in the world. The flipside of such awkwardness, of course, is the puppet or dummy that moves and speaks with such perfect mimicry that we are hard-pressed not to accept it as being alive. In both instances, our uncertainty as to whether something is living or not reflects an uncertainty about whether it possesses intelligence, whether its movements are guided by thought or, like the living dead in George Romero's classic horror films, merely by reflex and habit. For this reason, spectacles of mindless movement can be uncanny in and of themselves, evoking a deathly egolessness (hence the uncanniness of the severely retarded) or the fantasy of empty vessels controlled by an invisible or absent intelligence (a fantasy prompted by synchronized swimming displays, for instance, in which near-perfect performers take on the quality of automatons).

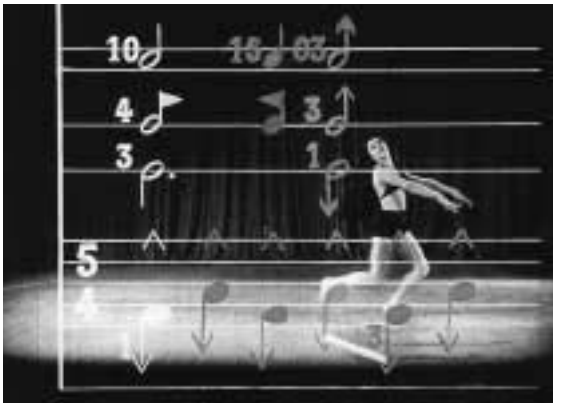


Acera or The Witches' Dance, 1972.

Our aesthetics, then, imbue such displays with a haunting quality, spooked by the specter of the inhuman, behind which lurks our fear of death. Curiously, one of Painlevé's few films involving people evokes this same terrain: *A Notation for Movement*, based on composer Pierre Conté's system for graphing dance movement, includes a remarkable sequence in which a musical score is superimposed over dancing figures, whose limbs seem to follow paths charted by the grid of lines and notes they traverse, as if they were programmed marionettes obeying an inhuman logic. And what could be more mindlessly inhuman than the intimate spectacle of continuously quivering microscopic cilia, one of Painlevé's favorite visual motifs. Watching their energetic gyrations, their blind and slightly frantic dance, it is easy to feel

vaguely unsettled, and the very vagueness of this feeling adds to its discomfort. The utter mindlessness of their furious activity, exacerbated by their infinite numbers, makes for a disconcerting image, yet there is something else here that gnaws at us as well: though not regulated by an individual intelligence, these movements are functional and reflect an intelligence— environmental and evolutionary—that is far vaster than our own puny claim in that area. Perhaps, then, it is this sublime conceptual landscape that makes us a little edgy, as it makes our most precious human currency—our vaunted intellectual capacity—appear dwarfed and diminished by comparison.

Painlevé's films, then, do not simply substitute human characteristics for animal ones in portraying his subjects so much as they mix up our categories of human and animal. Though the comparison may seem far-fetched, it is a strategy which also characterizes burlesque (Painlevé, after all, did make dance movies). The costume of burlesque performers—six-foot-long boas in tropical shades, evening gloves and garter belts, feathery elbow bands, capes ornamented with fringes and tassels—serves less to focus attention on a dancer's physical attributes than to transform them into something fantastic, strange, and awe-inspiring, and the model for this sensational plumage is the visual displays of the animal world, in particular the showy presentations that characterize rituals of mating and aggression. Fans used in fan dances look



A Notation for Movement, 1949.

like vividly colored wings; stiletto heels suggest sharpened claws; white knee-socks and black stockings, as well as elbow-high gloves, mask and segment the body into attention-getting patterns. Key parts of the body, meanwhile, are strategically exaggerated: just as a female chimp in estrus attracts would-be suitors by displaying her astonishingly swollen anal fruit, a burlesque dancer's pasties grab our attention by extending ordinary nipples into outlandish growths. Burlesque thus makes the familiar (a woman's body) seem strange and mysterious precisely by making the strange (the awesome aesthetic displays of animals) seem at home on a cabaret stage. Painlevé's rendering of primitive movements as aestheticized choreography accomplishes something similar: by making the strange seem familiar, it comically confounds our desire to clearly delineate "us" and "them."

If there remains something amusing, if not slightly scandalous, in the sight of a mollusk ménage à trois, it is only because this spectacle still serves as a screen for our own dreams of seduction and metamorphosis. Yet Painlevé's burlesque generally confuses our anthropomorphic lust, as the object before us continually mutates into strange new appearances; indeed, the dreamlike quality of his underwater circus derives in part from the giddiness we experience before the mind-boggling otherness of the creatures he documents, the phantasmagoria of their endless forms and transformations. This aspect of his films occasionally serves as a corrective to our anthropomorphic impulses: confronted with intimate closeups of the vibratory cilia of a sea urchin's triple-jawed pedicellariae, we tend to marvel at their utter bizarreness. Simple identification is out of the question, however; more likely, our own prized uniqueness may suddenly seem a little less secure, given its context in this dizzying theater of metamorphosis.

The effect produced by such a revelation can be nausea as well as delight. A striking example of the former can be found in Les Blank's excellent *Burden of Dreams*, a documentary on the disaster-afflicted production of Werner Herzog's film *Fitzcarraldo*, which was shot on location in the Amazon. In one scene, a profoundly exasperated Herzog appears in a jungle

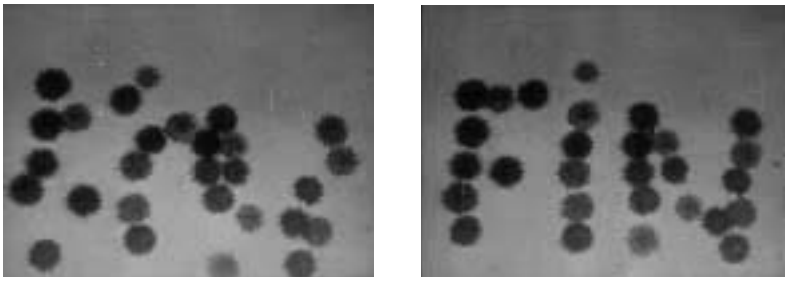
thicket, hysterically denouncing the obscenity of the jungle's promiscuous growth, its shameless pullulating variety, the unrestrained lasciviousness of its life force. Herzog's outburst recalls the famous cry of "the horror, the horror," issued by Joseph Conrad's character Kurtz in *Heart of Darkness*, albeit in semicomical fashion. But it is telling that his anger vents in the form of disgust. That nature is obscene and foul rather than wondrous or picturesque—this is truly the civilized point of view. Indeed, nature's spectacle of ceaseless growth and movement may appear to be terrifying as well, a threat not only to the sanity of film directors but to Reason itself.

In the mainstream of Western thought, lively movement—or the kind of dance of life so lovingly recorded by Painlevé—is seen as anathema to orderly reason, which, by contrast, is associated with states of contemplative stillness. In this schema, stasis, like still water, offers clarity, and this aesthetic is reflected in the static, fixed classifications favored by the puritans of science. Perhaps the ultimate uncanny achievement of Painlevé's films is to turn those categories on their heads so that we glimpse a world in which movement is the universal alphabet, the common language through which our experience of life is manifest. It is no coincidence that Painlevé typically ended his films with a witty flourish in which the live organisms we have just been watching rearrange themselves into the shape of static letters spelling "Fin." When movement ceases, in other words, the show is over.

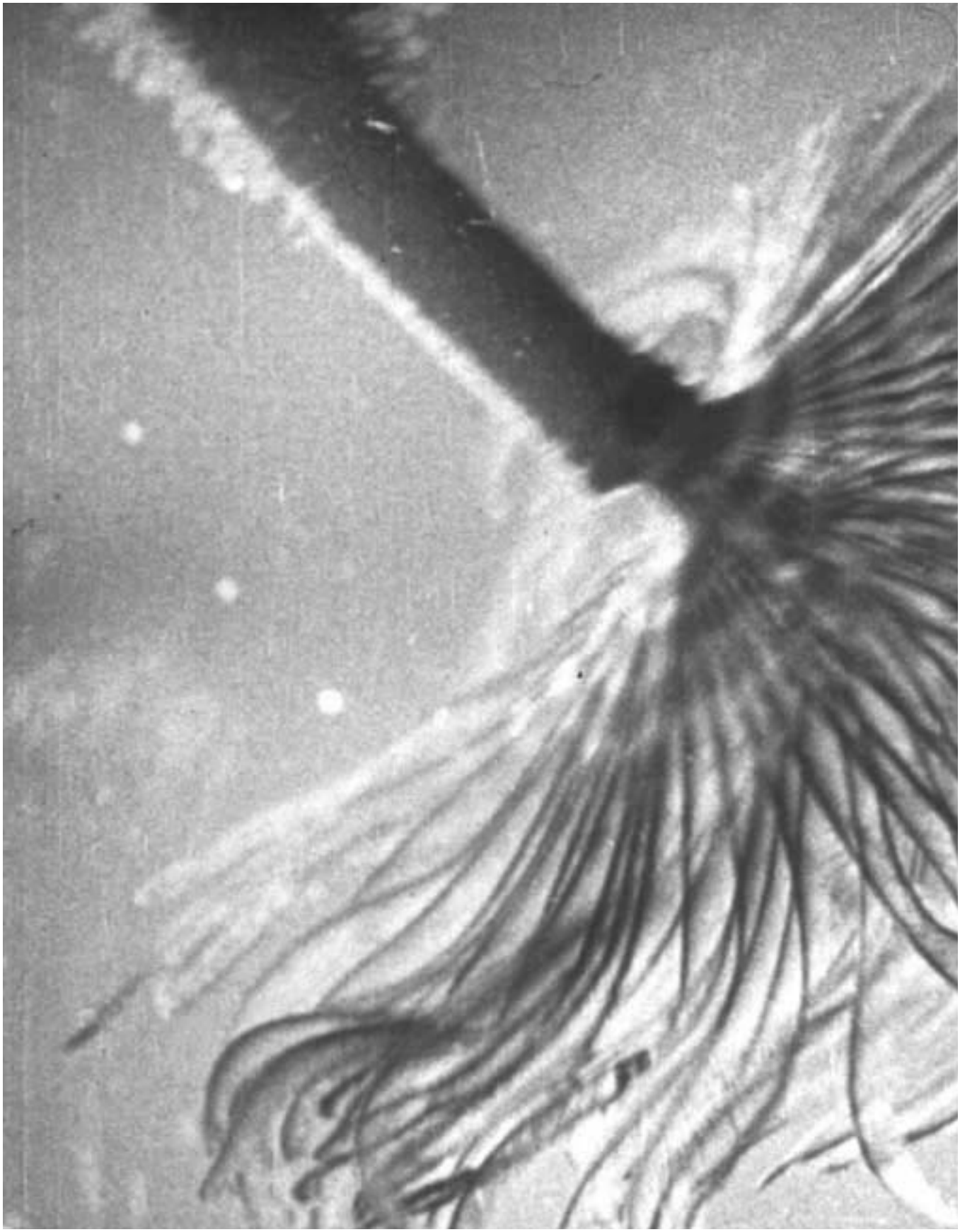
There is a Sufi tradition in which certain esoteric ideas are communicable to initiates only through dance; the performers themselves become the changing letters of a text that can be read only in movement. Here is a dream image of meaning as something inseparable from life as it is actively lived. By contrast, our traditions of thought and reason are essentially posthumous in character, placing us outside life in our attempt to understand it—putting us, in other words, in the uncanny position of the living dead (a position that lends itself to disdain for nature's mindless movement and growth). Perhaps this outsider position is why we give vision, rather than feeling and internal sensation, such an important role in our practice of knowledge: to see is to

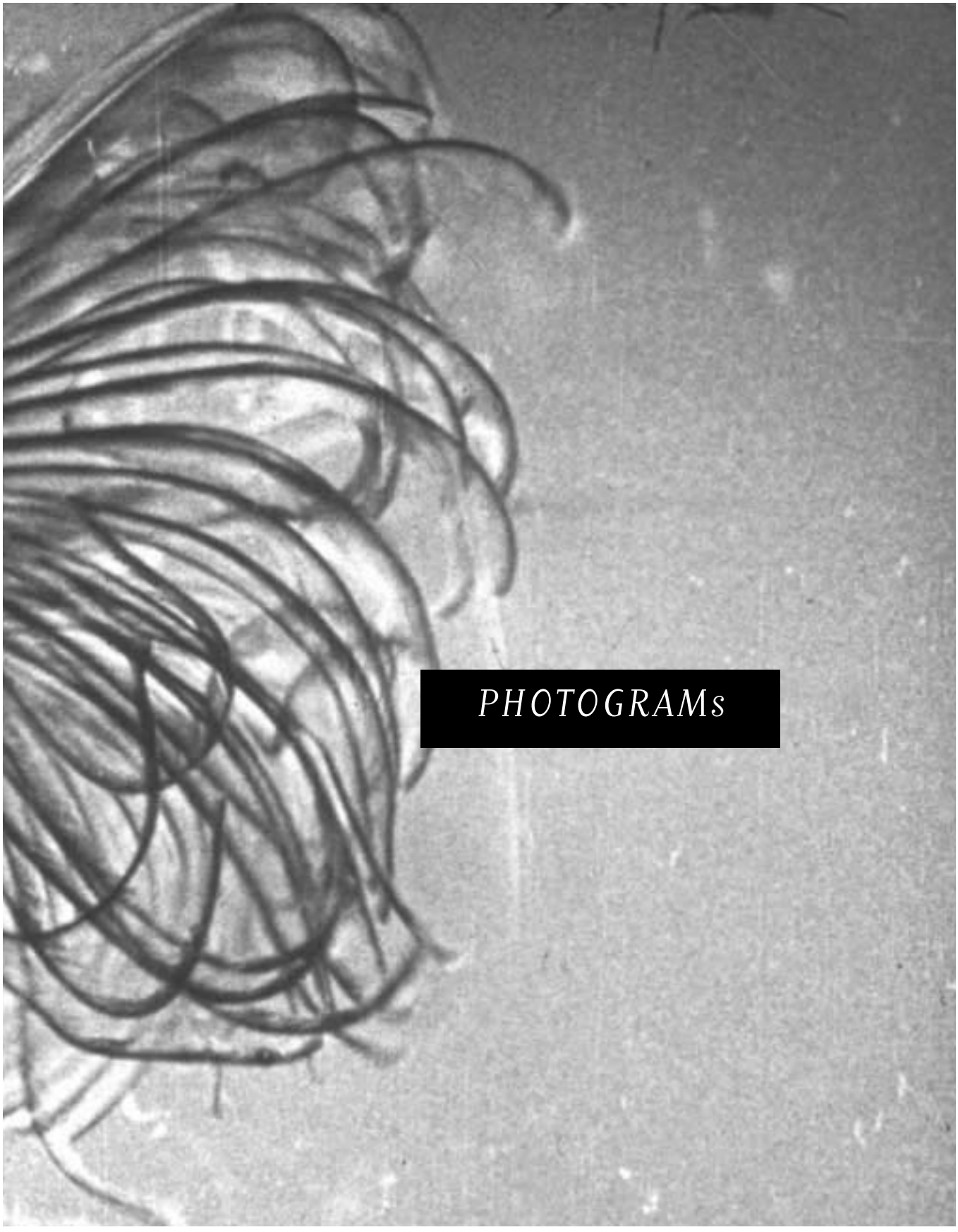
know, and the more we see, the more we believe we can understand. Painlevé's quirky cinematic enterprise, on the other hand, suggests that in as much as life itself is defined by continual metamorphosis, it is only in its mad dance that meaning can reside.

Is it too much of a stretch to read such notions into Painlevé's idiosyncratic documentaries, these odd fossils from film history's cabinet of curiosities? There has been room here to touch on only a few of the seemingly incompatible approaches evident in these intimate yet clinical portraits, these urbane nature films with their studiolike mise en scène, their unflinching images of beauty and horror, and their curious moments of sadism, which seem to insist that we live in an amoral universe. Some people, no doubt, will dismiss them as incoherent or trivial precisely because they comprise such a disconcerting mix of elements. Yet the uncanny, contradictory character of Painlevé's films, worked out with such wit and playful thoroughness, would be well worth our attention even if he had never been ingenious enough to devise ways of filming the invisible poetry of aquatic life, as it persuasively demonstrates that "culture" can be as entertaining and messy as life itself and that the spirit of science can be as large as that of religion, linking, like the tails of two seahorses, both terror and grace.



Sea Urchins, 1954.




PHOTOGRAMs

METHUSELAH
(Mathusalem)
1927, black and white, silent, 7 minutes
Music: Maxime Jacob

METHUSELAH

Five film sequences projected on a background of white clouds for a play by Ivan Goll at the Michel theater in 1927

Film by Jean Painlevé

with Antonin Artaud, Marcel Barencey, Grivas, Henri Marchand, L. Medgyès, Armand Moss, Jean Painlevé, Daniel de Wybo

Josephine Baker's understudy at the Moulin Rouge and the patrons of the Café Raoul

Costumes and set design: Alexeieff, L. Medgyès, Geneviève Hamon

Music: Maxime Jacob (originally performed in the theater by a Republican Guard sextet)

1st scene: Barencey in the role of Methuselah dreams: a shoe flies round the world, his name appears on the Eiffel Tower, the Palais du Trocadéro, the Stock Exchange . . .

METHUSELAH

2nd scene: A young black dancer, Josephine Baker's understudy, dances the Black Bottom on Yorrick's grave. Jean Painlevé as Hamlet presents Yorrick's skull at Hamlet's tomb.
Methuselah takes the skull from him, substituting a Methuselah shoe. The director Grivas objects. Methuselah chases him away and places the shoe in Hamlet's hand.

3rd scene: WOODEN CROSS. Methuselah orders his three officers to attack: Wybo as monocled captain, Artaud as a chasseur of Africa, Jean Painlevé as quartermaster with a pince-nez.

METHUSELAH

4th scene: FUNERAL. Artaud as bishop follows the coffin carried by the Bugatti driven by Jean Painlevé. The heirs follow on scooters, arguing over the inheritance. A fight breaks out.

5th scene: WEDDING. A procession led by Marchand as the bridegroom and an extra from the Café Raoul. Nannies with their prams, Medgyès rifling through a postman's bag.

FIN

HYAS AND STENORHYNCHUS
(Hyas et sténorinques)
1929, black and white, 13 minutes
Music: Chopin, orchestrated and conducted by Maurice Jaubert

A Walk in the Garden

It's a feast. The sun plays on the water, flowers are blossoming, each tentacle of the sea anemone is loaded with poison. The giant oysters open to the gentle current and close greedily on whatever prey passes their lips. The seaweed is so attractive, its color so tempting you can't resist touching it when bang! the enormous oven-shaped mouth of the angler fish suddenly opens and closes; it digests its food and again sets out its fishing line. This lazy creature ejects the residue of digestion simply by opening its mouth—the garden needs fertilizer to thrive.

Every hue is gathered here: shades of crystal purple brought by sea urchins and starfish, blues from the canopies of jellyfish. At birth, these jellyfish are stacked like plates on top of each other. Who would have thought they would become so lovely?

The jellyfish in diverse colonies, quite unpleasant to the touch, innocently display their terrifying tentacles. The sun glittering on the water continues to hypnotize; this garden, perhaps too calm, induces sleep.

The table is set for the starfish: he need only extend his stomach and engulf his prey. Yet the scallop, alerted by the slow approach of the starfish's thousands of feet, flees quickly, her valves clacking. The racket startles everyone. The sun hides. In the garden, it rains.

HYAS AND STENORHYNCHUS

Hyas and Stenorhynchus, marine crustaceans

Each dresses in its own style . . . Algae on the tip of the nose is undoubtedly striking.

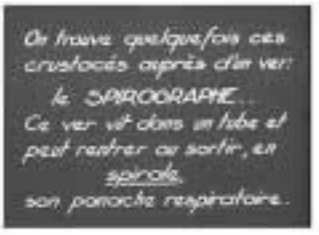
The hyas and the stenorhynchus are often difficult to distinguish from their environment.

The stenorhynchus is slender; with long legs and large claws.

Like all crustaceans, they are arm-wrestling enthusiasts.

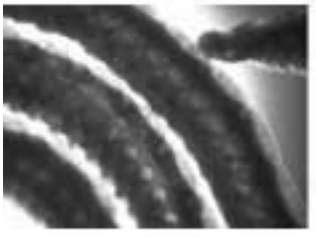
HYAS AND STENORHYNCHUS

Seen from above, the animal simply looks like a clump of seaweed out for a walk.

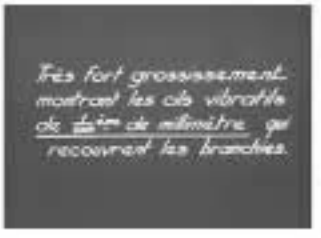


Sometimes one finds these crustaceans near a worm: the great fan worm. This worm lives in a tube and can extrude or retract its respiratory plume in a spiral.

At the center of the breathing plume, the mouth.



We are going to see the branchiae of the plume increasingly enlarged.



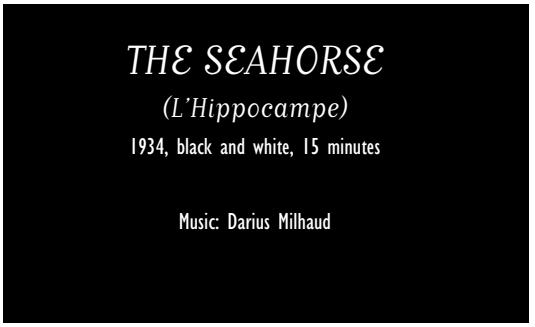
High magnification shows the vibratory cilia 1/1000th of a millimeter long covering the branchiae.

This movement circulates water and sends nutritious particles into the worm's mouth.

HYAS AND STENORHYNCHUS

Caress of the great fan worm.

Following a classic spiral retreat: fireworks.



Surprise

The *Periophthalmus* perches in the undergrowth and draws its eyes back into its skull, snorting. There are other fish, equally rare, with eyes at the ends of extensible stalks, which is as practical as it is attractive. But most fish simply roll their eyeballs around in their sockets, often independently of each other.

Without eyelids, the round eyes of fish express constant surprise. Yet this is justified when encountering the *Hippocampus,* the seahorse, with its slow, formal appearance, incapable of flight. But fleeing would ill-suit creatures of such dignity. What can be said about these vertical animals with their distinguished sadness, these old repressed gargoyles? And with such manners! Not only does the female possess the male, burying the nipple of her cloaca into the pouch of his stomach, but she also transfers her two hundred eggs to him. The male will then fertilize the eggs and carry them for weeks, while a genuine placenta is formed so that the blood of the father can nourish the embryos. A painful delivery follows, rich in suffering and agonizing labor.

If only it ended here . . . But there is still that damned secretion of gases from the pouch, which continues even after the last of the offspring has been expelled. And sometimes the lips of the orifice stick together, causing the pouch to swell and leaving the male seahorse floating upside down—which is no position for him to be in.

THE SEAHORSE

In spite of its name and its strange appearance, the seahorse is only an ordinary fish . . .

It is the only aquatic vertebrate that swims standing up. This upright posture gives it a pompous air.

The tail is used for balance, never for propulsion.

THE SEAHORSE

Its pouting lips . . . give it a slightly embarrassed air, transformed into anxiety by the highly mobile eyes.

Strangest of all . . . the abdomen of the male has a pouch in which the female lays 200 eggs.

The male fertilizes the eggs he receives from the female . . . and nourishes the embryos in his pouch.

The expulsion begins.

Opening the male's pouch, one can see a network of blood vessels that nourish the embryos.

The body begins to take shape.

THE SEAHORSE

The heart . . .

Soon the snout lengthens.

Although his pouch is now empty, the male is still agitated by contractions . . .

A headlong flight, so common to other animals, would hardly be permitted given its dignified stance.

THE FOURTH DIMENSION

(La Quatrième Dimension)

1937, black and white, 10 minutes

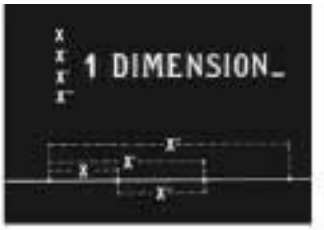
Produced by Jean Painlevé

Directed by Achilles Pierre Dufour

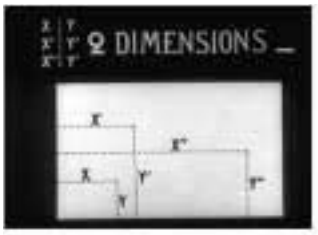
Scientific advisor: Henri de Sainte-Laguë

THE FOURTH DIMENSION

Solids surrounding us have length, width, and depth. We know them as having three dimensions.



A thread, so thin that its width and depth can be ignored, has only length. It has only one dimension . . .



A sheet of paper, ideally thin, has no depth. It has only two dimensions . . .

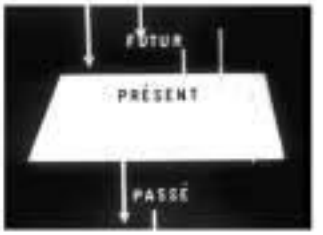
Bricks placed side by side have three dimensions.

Let us imagine creatures infinitely flat living in a plane of two dimensions . . . They will not be able to imagine that anything exists outside their universe . . .

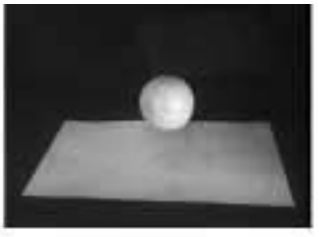
Similarly, if there were a fourth dimension, any being living in it could manifest itself to us in a mysterious way . . . it could pull our ears . . . it could materialize in our universe like a fairy in a fairy tale.

THE FOURTH DIMENSION

A four-dimensional being would see simultaneously all of our organs.



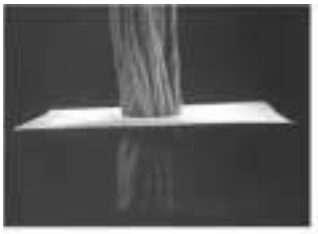
Let us now make a new assumption that time is one of the three dimensions.



Let us consider the crossing of this world by an orange.

. . . a solid outline that reveals the history of the past as well as the future.

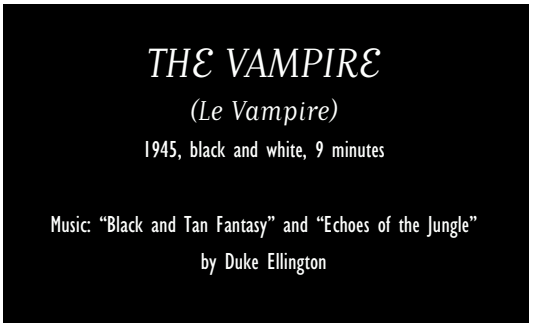
THE FOURTH DIMENSION



. . . consider different portraits of a single person at different times of his existence as a reproduction of sections in three dimensions of a four-dimensional being who would be fixed and unchangeable.

Are these assumptions corresponding to any reality?

These are only assumptions to encourage thinking . . . analytical mathematics push the limits of what is possible.


THE VAMPIRE
(Le Vampire)
1945, black and white, 9 minutes
Music: "Black and Tan Fantasy" and "Echoes of the Jungle"
by Duke Ellington

Green Hell

The moist heat crushes man . . . He alone sees nothing of the trembling shadows, hears neither the crunching mandibles of insects tearing each other apart fearlessly nor the intertwining of flowers. The night encompasses rampant odors, the dramas of appeasement—hunger, desire. Death is in full swing. Jumping spiders as big as plates, with shining eyes like those of cats, massacre birds. The serpent slithers around a vine, taking on its form, then shoots past the throat of a puma, and engulfs a buffalo toad, muffling its cry.

This is the hour of the Vampire, of all the murderous legends. And as bad reputations are generally made in the corner of the woods, it is at the edge of the Chaco forest that the Vampire makes his . . . Joy accompanies bloody binges, his silent grimaces sound the call of nature. On crippled legs, he lurches, his paunch good and swollen. Where murder reigns supreme, we must be grateful to him for simply stealing a bit of blood here and there from a sleeping herbivore or man, and not taking its life. His calling card reads:

Paralyzing Rabies and Sleep Disorders

House Calls

THE VAMPIRE

Strange animals of frightening form and movement . . .

The grace and terror of gestures . . .

Poet and artist—how many legends have inspired you?

Disease transmitted by liquids secreted from the thighs of insects as they swell with blood . . .

THE VAMPIRE

. . . human imagination has given to the Vampire an image of a human being drinking blood directly from a wound on a human throat.

. . . in the virgin forest of Chaco, "The Green Hell."

The star of this film . . . is called *Desmodus rotondus.*

It moves like a cripple, limping on its hindlegs and leaning on the bent thumbs of its forelegs . . .

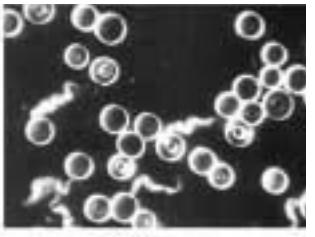
Its lower harelip and the mass of quivering flesh overhanging its snout emphasize its hideous grimace . . .

Decency has replaced man with a guinea pig, the researcher's docile auxiliary.

The vampire kiss . . .

THE VAMPIRE

The saliva contains an anti-coagulating substance which facilitates the blood flow. In one single meal it can empty a guinea pig of its blood . . .



. . . trypanosomes seen here greatly magnified among blood cells.

The vampire bite also transmits an endemic disease, the illness of Caderas, a sort of malaria that ravages herds in South America.

The salute of the vampire . . .

FRESHWATER ASSASSINS

(Les Assassins d'eau douce)

1947, black and white, 25 minutes

Music: "Mahogany Hall Stomp" by Louis Armstrong; "Drop Me Off in Harlem," "Slippery Horn," and "Stompy Jones" by Duke Ellington; "Wire Brush Stomp" by Gene Krupa; "Rhythm Spasm" by Baron Lee; "White Heat" by Jimmie Lunceford

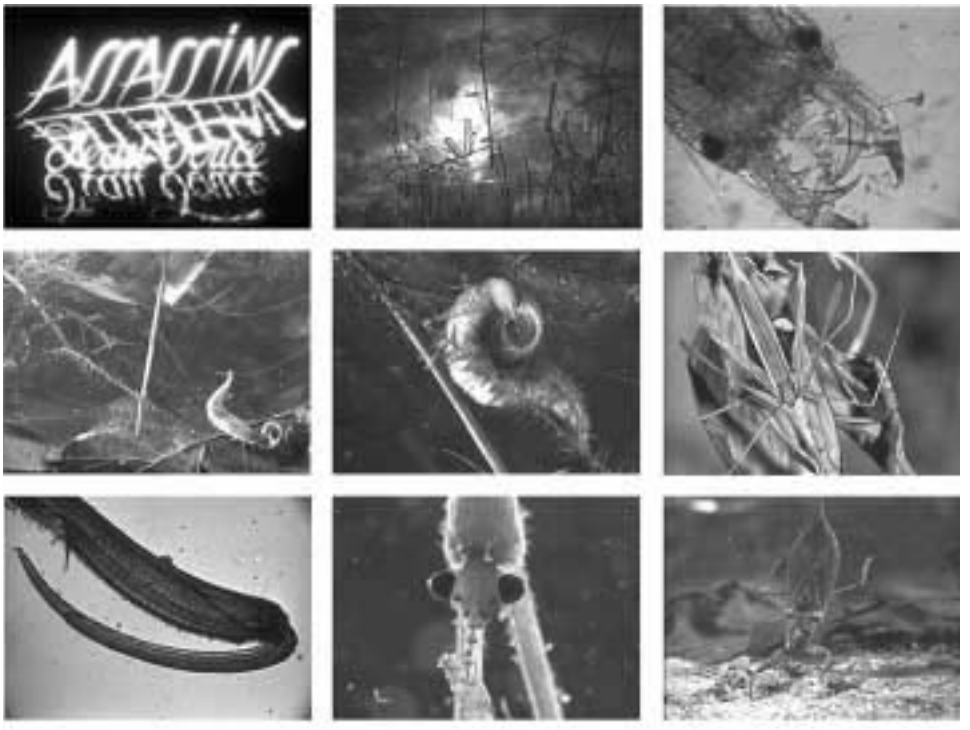
Still Waters

A rustling of wind, faint reflections, reeds swaying, the charm of the pond . . . Tranquil and secure . . . Nothing stirs in the water. But in every corner of algae, behind every root of horsetail, or beneath a blanket of dead leaves, watchers lie in ambush. To eat or to be eaten—this is the outcome of every encounter, at night as well as day. Death without anger, without passion, without reflection, without delay, without morality; necessary death: it fulfills a need.

A paralyzed motionlessness precedes the abrupt and precise move that seizes the prey. Shelling, chewing, smashing, sucking, grinding, swallowing—there are a thousand different threats. Some predators have mouths, others don't, but it all ends up in the stomach somehow. Here a pump, there a spike, elsewhere an articulated mask. The catch is held fast by the curvature of the body, by the ravaging claws, by the fangs; it is impaled, dissected. Yet some of these carnivores, once adult, become little more than bucolic vegetarians. And it cannot be said that the bigger eats the smaller because the larva of the water beetle, scarcely born, will hurl itself onto anything, regardless of size, as long as its fangs can penetrate. Then immediately through these fangs, which are connected to the digestive tube, there is a constant pumping and sucking, a back-and-forth motion injecting gastric juice and swallowing the pulp of dissolved tissue—predigested foods are easily absorbed . . . In any case, the water beetle larvae are insatiable. And when two of these killers meet, the battle is particularly ferocious and without respite; the antagonists often die together, each taking the other's life.

In all these murders, one is overwhelmed by the supplicating gestures of the victims; one can imagine their cries. However, this is just a question of custom: in the town of Saint-Amour, children watch pigs being scalded.

FRESHWATER ASSASSINS



In a pond or simple puddle, freshwater harbors intense life. This life can be summed up into two clearly distinct outcomes: to eat, or to be eaten. We will study here, several forms of alimentary destruction.

BLOOD OF THE BEASTS

(Le Sang des bêtes)

1949, black and white, 21 minutes

Directed by Georges Franju
Narration written by Jean Painlevé

On the outskirts of Paris, in vacant lots, are the playgrounds of poor children, scattered with the odd debris of discarded wealth.

Disassorted delights for the curio seeker, for poets and passing lovers, at the edge of the domain of trucks and trains.

At the Port of Vanves there is also the Vaugirard slaughterhouse. The municipal slaughterhouse, despite its emblem of the bull, specializes in the slaughter of horses.

The tools of the trade vary according to the animal: the reed; the poleax; and the Behr gun, which stuns the animal by percussion.

After the slaughter, the horse is hoisted by cable and drained of its blood.

It is then lowered to be skinned.

Compressed air pumped under the skin facilitates the process.

The feet, detached, will be taken away by the horse-slaughterer.

BLOOD OF THE BEASTS

The hooves will be used for fertilizer and the bones will serve, among other things, in the fabrication of souvenirs of Paris.

The delicate task of flaying with a razor-sharp lancet is not without its dangers.

That's how Ernest Breuillet severed his femoral artery. He had to have his right leg amputated.

This black horse was slaughtered by Alfred Maquart, an "honored worker of France." That's Auguste Maquart, whose grandfather founded the art of butchering at the turn of the century.

On the outskirts of Paris, the Canal of Ourcq and the wheels of fortune. At the Port of Pantin, the Villette market.

The slaughterhouse is linked to the market by a bridge over the canal, which is used for the transport of livestock.

The butchers and scalders work amid the deafening noise of pneumatic winches and while surrounded by the gray vapors of the blood of the beasts.

BLOOD OF THE BEASTS

Marcel Griselle, former boxing champion. André Brunier, one of the finest axmen.

Inserting the reed into the medullary canal destroys the spinal cord, stopping the animal's reflexes.

Pressing completes the draining of blood, which is collected in receptacles. The overflow streams down the gutter.

Disemboweling is done while the winch is being hoisted. The scraps of fat will be collected by nuns.

Henri Fournel, a man who can split an ox in the time it takes the clock to strike the twelve chimes of noon.

The white meat of veal requires the complete drainage of blood by decapitation.

The dead animal is still animated by involuntary reflexes, manifestations of a purely vegetative state.

The heads are branded for numbering and identification.

This is not a chapel built to glorify John the Baptist, patron saint of butchers, or the memory of his gentle lamb. It is the auction house of the slaughterhouses.

BLOOD OF THE BEASTS

The sheep are led by the traitor among them, the one who knows the way and whose life will be spared.

The others follow like men. They bleat the way hostages sing, knowing it is to no avail.

During the skinning, the sheep is punched; a cyst can form on the wrist of a worker after several years of this hard work.

"I will strike you without anger and without hate, like a butcher," said Baudelaire.

Without anger, without hate, and with the simple good humor of killers who whistle or sing while slitting throats. For one must eat each day and feed others at the cost of a very difficult and often dangerous occupation.

The day comes to a close. In the stalls, the troubled sheep will fall asleep with the silence. They will not hear the gates of their prison close nor the Paris-Villette train that will leave at dusk for the countryside to fetch tomorrow's victims.

BLUE BEARD

(Barbe bleue)

1938, Gasparcolor, 13 minutes

Produced by Jean Painlevé

Directed by René Bertrand

Music: opera buffa by Maurice Jaubert

Lyrics by Jean-Vincent Bréchignac

BLUE BEARD

Here comes Lord Blue Beard
What a mustache, he is hideous
And what a beard, he is frightful

My six wives are dead
And my castle is bleak
Your two daughters are beautiful
And there innocence is futile

Thirty pearl necklaces
A thousand silk dresses

Oh! What excitement!

It is of love that roses sing
Sweet and low, among other things . . .

BLUE BEARD

The smallest of these keys
opens the door to the forbidden room
of our fortress

No one may enter lest they be
killed!

Oh! Fear my anger
Madame, you must die!

BLUE BEARD

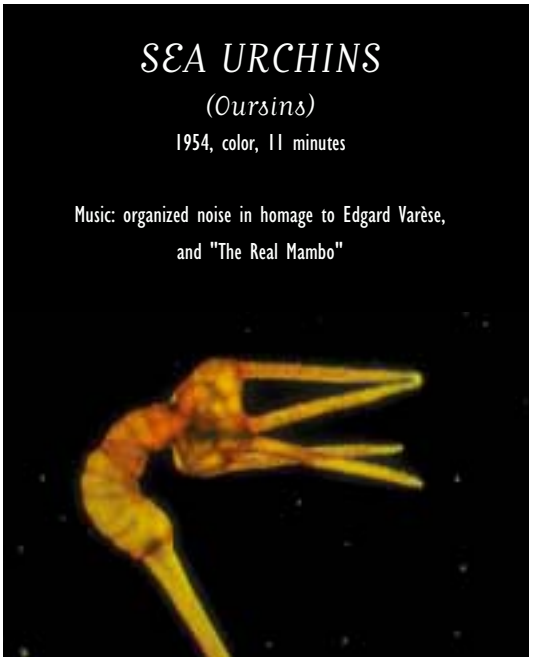
At the moment I can see the dust rising in clouds
And the grass greening

Madame, you must die!

I can see two horsemen armed with rapiers
coming toward us

Oh, hurry, hurry, hurry. . . !

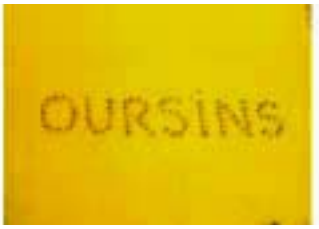
Curiosity, however enticing,
often brings regrets,
often brings,
often brings regrets!



A Walk in the Forest

The sea urchin is a delicacy. Gourmets soak up everything by dipping a piece of bread in the open shell; discerning palates choose the reproductive glands: iodized hazelnut. But the most amazing part is the shell. At first glance, one sees only an impenetrable forest but then begins to distinguish the moving spines. And with greater scrutiny, it is revealed that these do not aid locomotion at all but that this role is assured by a system of highly specialized hydraulic feet: passing through hundreds of holes in the shell are little flexible stems, each ending in a sucker. Under the shell, these hollow stems swell into a bulb, and all the bulbs are connected to one another by channels of water. When the bulbs contract, they force water into the elastic stems that then extend forward, transforming the forest into a flower. If the suckers encounter an obstacle, they stick to it. The stems then shorten, sending water back into the bulbs, and the sea urchin is pulled toward the fastened suckers.

SEA URCHINS



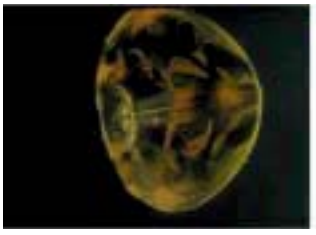
Varied in color, almost spherical, they measure four to ten centimeters in diameter.

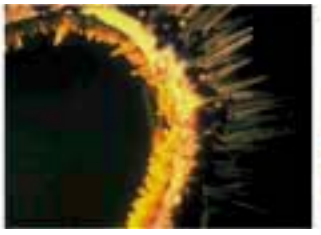
. . . they resemble Doric columns.

Magnification allows us to venture deeper into the forest. Around the spines, which now look like Doric columns, we discover another smaller forest of shrubs. These are the pedicellariae: minuscule organs belonging to the sea urchin and formed of the same substance as the spines. Their hard stems end with three jaws, which muscles open and close perpetually. Some pedicellariae have long, thin jaws with an openwork design. Others, powerful and continuous, evoke the heads of serpents. Others still, the cleaning pedicellariae, resemble clovers; they clean the surface of the sea urchin and the fluting of the spines. Last, some pedicellariae possess jaws equipped with poisonous glands and teeth beveled like hypodermic needles. And over the entire sea urchin extends a carpet of vibratory cilia, except on the ends of its spines . . . Perhaps, these have been worn down . . .

SEA URCHINS

Five teeth allow it to dig, crush, loosen, and absorb all sorts of debris stripped from the rock.





A sea urchin that has been injected with gelatin and whose shell has been removed will show its internal organs.

Each stem is connected beneath the shell to a muscular bulb filled with water. All these bulbs lie against one another like the pages of a book.

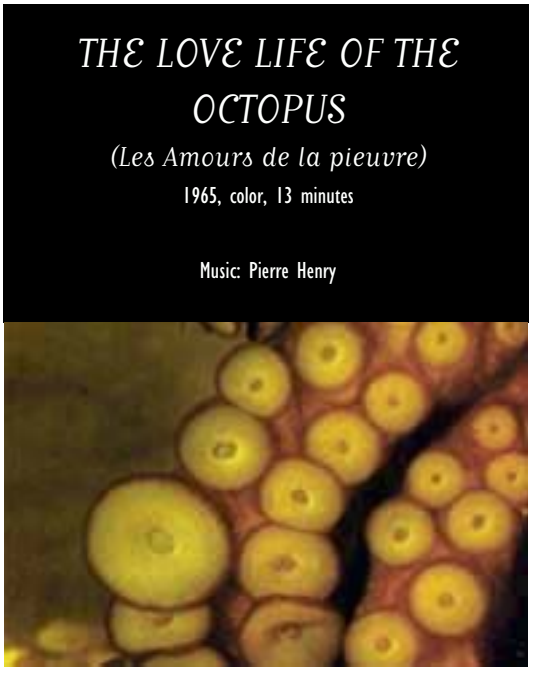
SEA URCHINS

Amidst a forest of spines stir delicate crystalline forms . . . like nails from our own flesh. They are called pedicels . . .

The smallest ones have jaws in the shape of clovers . . .

Others suggest beaks on slender necks . . .

The jaws, strong and sturdy yet crafted like the finest lace, evoke a serpent's head.



Woman Who Embraces Tightly

Draped in her skin of changing colors, the amorous lady has closed her eyes . . . She has the heavy lids of a seductress, but the gaze within is always alert. Because this common mollusk has eyelids, she can vary her expression, unlike fish with the permanent surprise of their always-round eyes.

Better still, the structure of the octopus's eye reveals the cones and rods found in superior vertebrates. She sees far, aims well, and *thwap!* . . . Eight prehensile whips lash out, as if flung by the most deft, most dexterous cowboy. . . How can anything escape this repeated embrace? Each sucker, and there are hundreds of them, performs its function perfectly, even if the tentacle is severed. The crab, bound and breathless, receives a deadly kiss from the mouth of the octopus; with her terrifying, parrotlike beak, she can crack open the hardest shell.

THE LOVE LIFE OF THE OCTOPUS

Cephalopod
Horrifying animal . . .

It has folds resembling eyelids.

Water inhaled through an opening on each side of its body is expelled through a tube.

Meanwhile, the mechanics of her breathing continue undisturbed. Water is drawn in through the gills and expelled through a central tube, the siphon, which points forward. To swim, the octopus need only contract this siphon forcefully, propelling herself backward, and, because she is unable to see where she is going, may enter the gaping mouth of a conger eel . . . Quite a mouthful . . . The octopus is malleable. Her tentacles, the last to enter, hang like whiskers from the conger's jaws. These tentacles, properly prepared, are delicious with a sauce à l'américaine.

The moods of the octopus are revealed in her changing hues: she will turn red, black, purple, or yellow, depending on the area of pigment she contracts. Experiments have shown that she remembers things, recognizes things, and can adapt to society. She is offended by foul-smelling eggs and will throw them back at you violently, turning white with anger.

THE LOVE LIFE OF THE OCTOPUS

A crab flees but will be caught.

Several big suckers distinguish the male.

The male must insert the end of his special arm into the respiratory opening of the female. There is no recommended position to achieve this.

. . . sacs containing male elements enter the female's breeding orifice.

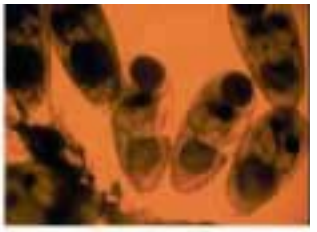
. . . releasing billions of spermatozoa.

THE LOVE LIFE OF THE OCTOPUS

These eggs are attached to a cord that she hangs from the roof of her nest.

Torsion . . . rotation.

A miniature octopus in its shell.



. . . they hatch—an explosion.

Those who don't get out now will never hatch.

ACERA OR THE WITCHES' DANCE

(Acéra ou le bal des sorcières)

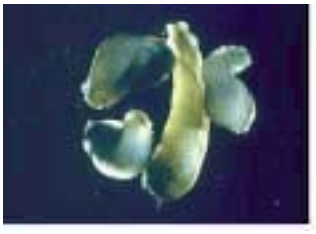
1972, color, 13 minutes

Music: Pierre Jansen

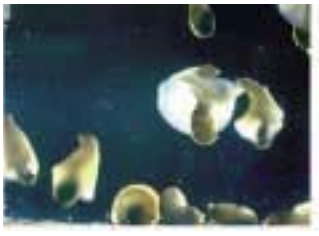
ACERA OR THE WITCHES' DANCE

Acera, a kind of mollusk.

On its face, two eyes . . .

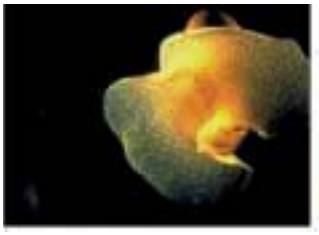


With the help of a crease forming a cloak around its body, it can also swim—its shell serving as ballast.



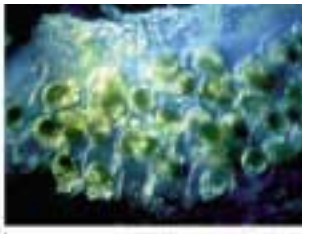
. . . dance is a way to find a partner.

THE WITCHES' DANCE



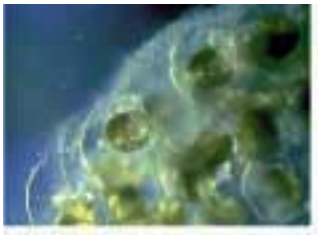
The reproductive organs are situated to the right of the neck. It is necessary to turn the neck when inserting it beneath the partner's cloak.

A chain of five. Bisexual, each animal functions as both male and female.

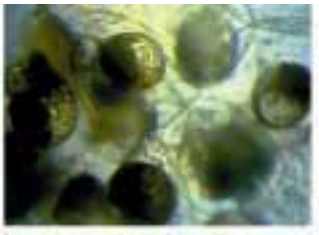


The endless egg laying takes place even during coupling.

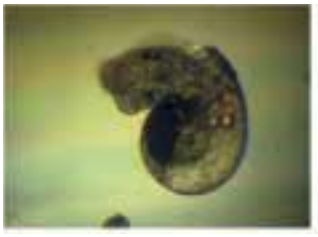
ACERA OR THE WITCHES' DANCE



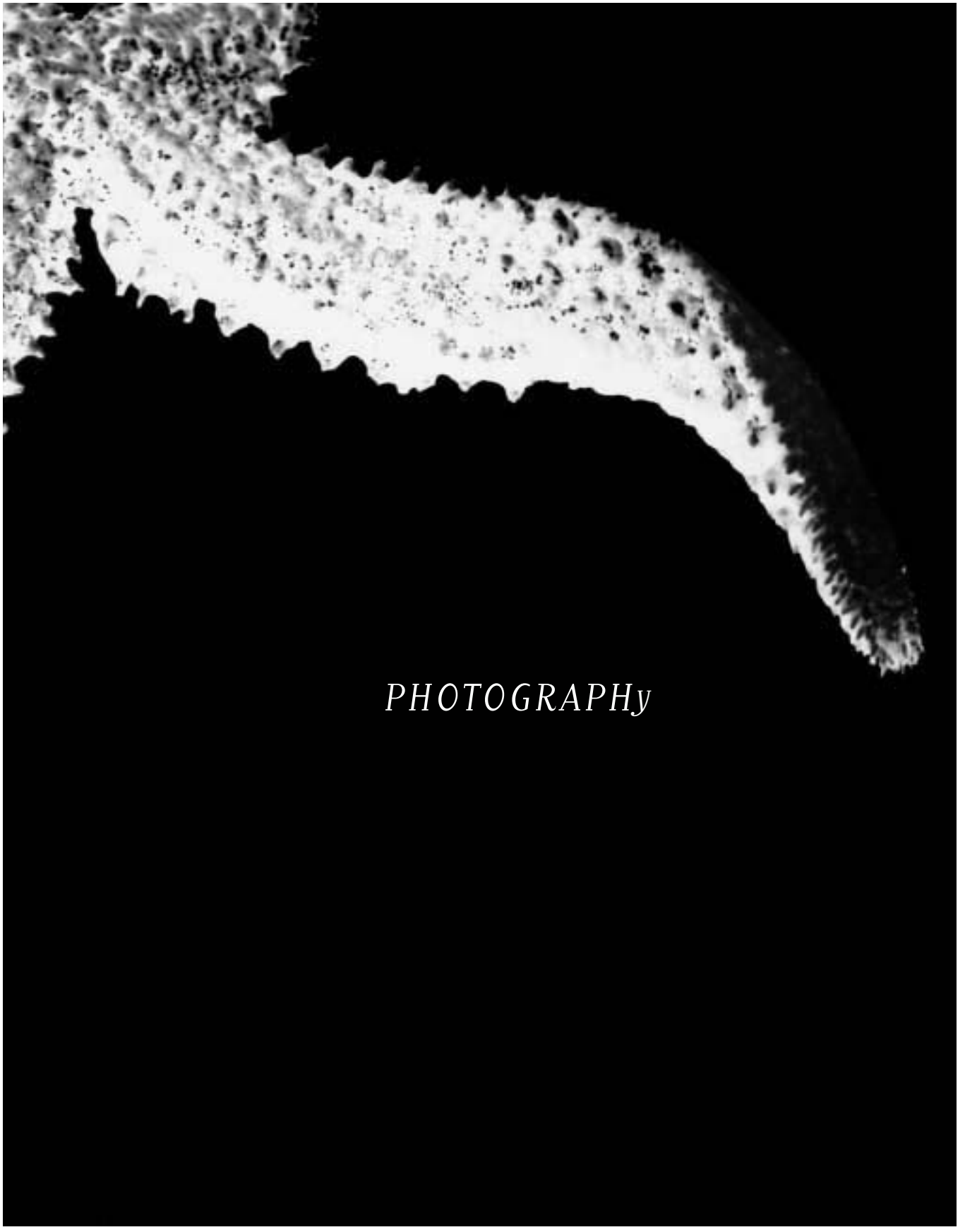
In each egg, a larva develops.



The vibratory cilia allow the larvae . . . to spread, carried off by the tide.

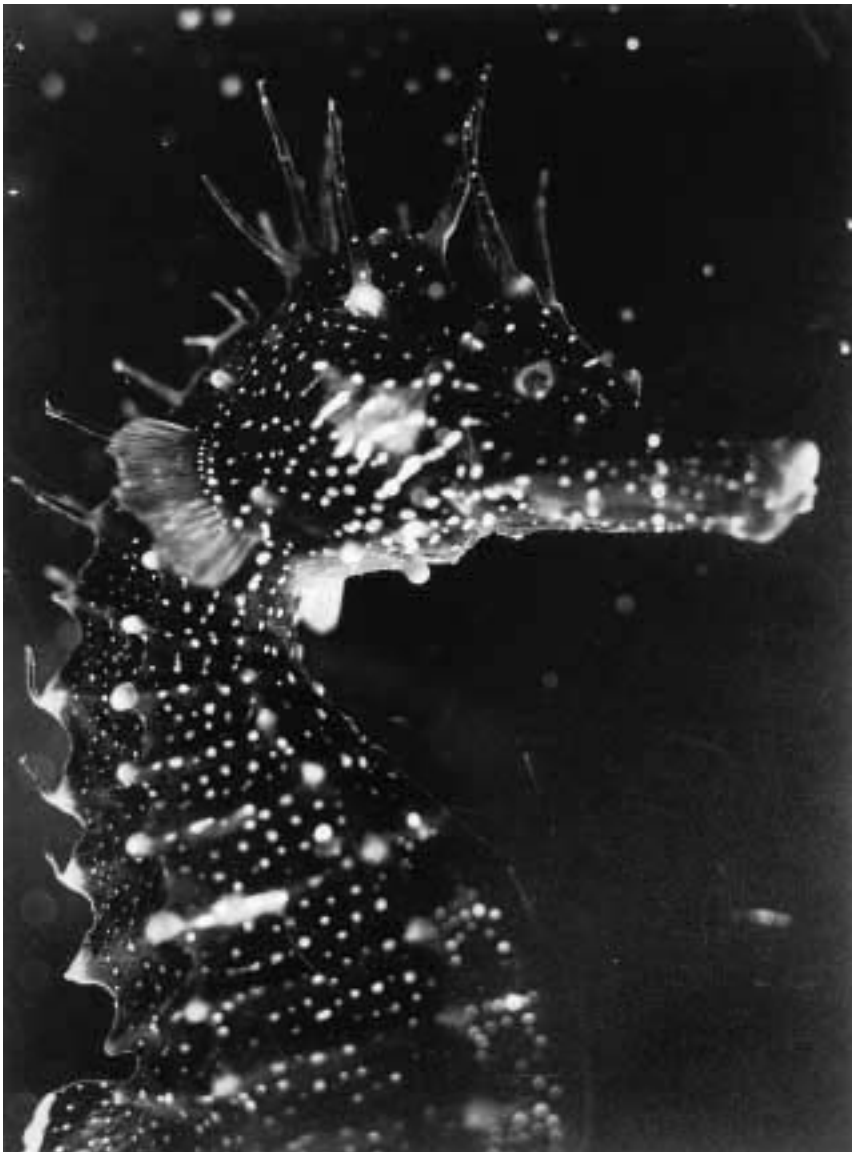


The youth when adult-size, will become a mother/father capable of reproducing itself for some time before dying.


PHOTOGRAPHy

Sea anemone, 1930.

Sea urchin pedicels, 1928.

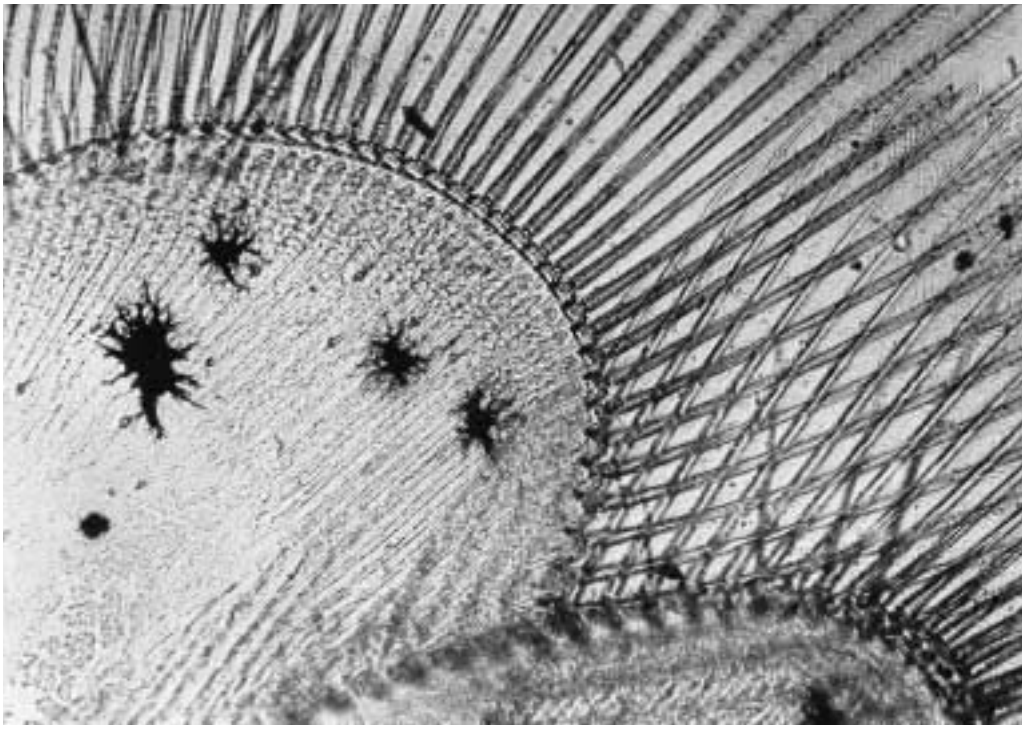


Seahorse, 1934.

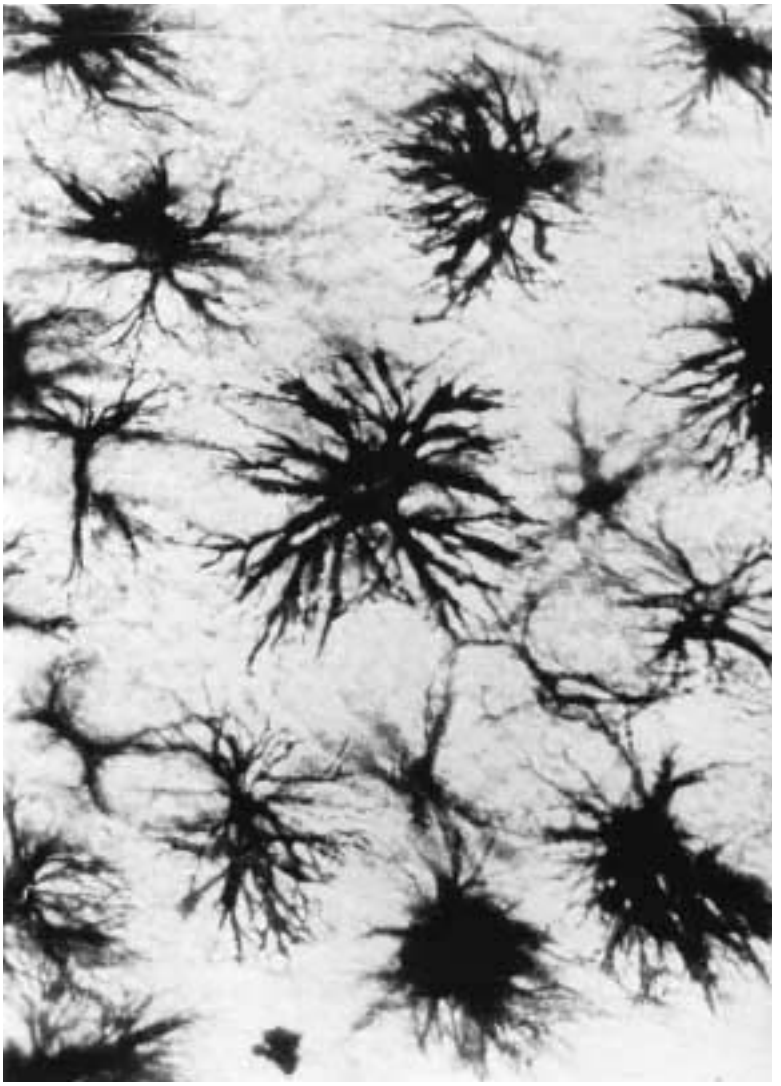
Starfish, 1928.

Grasshopper, 1930.

Grasshopper wing, 1930.



Shrimp tail, 1929.



Seahorse chromatophores, 1934.

Spider eyes, 1930.

Spider, 1930.

Lobster claw, 1930.

Butterfly, 1930.

Surréalisme
OCTOBRE 1924
1
Directeur : Ivan Goll.
Collaborateurs : Guillaume Apollinaire, Marcel Arland, P. Albert-Birot, René Crevel, Joseph Delteil, Robert Delaunay, Paul Dermée, Jean Painlevé, Pierre Reverdy.

NEO-ZOOLOGICAL DRAMA

Jean Painlevé

Surréalisme, 1924

(Mr. Jean Painlevé, who yesterday was honored by the Académie des sciences for a very realistic body of work, reveals himself to be Surrealist as well.)

The plasmodium of the Myxomycetes is so sweet; the eyeless *Prorhynchus* has the dull color of the born-blind, and its proboscis stuffed with zoochlorellae solicits the oxygen of the *Frontoniella antypyretica;* he carries his pharynx in a rosette, a locomotive requirement, horned, stupid, and not at all calcareous. But *Dendrocoelum lacteum* and *Planaria torva,* gonocephalous and olive-greenish, sharpen the pleasure of the hoops; the little turbellarian knows the embrace of their mouth; good for *Chironomus plumosus* to outline their intestinal arborizations in red lace; what spherical astonishment: he flees and ruptures the phlegmy threads reserved for the *Bythotrephes longimanus,* that sacred little crustacean with close-cropped hair; he would rather be born through parthenogenesis than touch these threads of the ovoviviparous *Mesostoma;* he has no choice; soft, elastic, and full of mucus, with neither truncature nor duplicature, he projects himself like Mercator on *Nephelis octoculata* whose eight eyes are not sufficient to express the fact that she has spent all summer laying eggs; the laborers produce little bundles; a Rotifera dries up in a corner; as it can be sensed that the sexes are separated, the *Prorhynchus* sucking stops; *Stephanoceros eichorni* is better; what difference does a double on a belvedere make. Stop. The turbellarians have seized it, penetrate by breaking and entering, pierce and suck; a horrible cry echoes and joins the lapping of luminous interferences; the cercaria of distome emerge from their stagnal hymens, cast a glance, and terror encysts them. The rolling in an S, a bit of zinc, the temporarily gelatinous sophistry pffft! filched.

The spermatogenesis only takes place in the male, says this old marc valve. Oh, there now!

MYSTERIES AND MIRACLES OF NATURE

Jean Painlevé

Vu, 1931

Does the complete understanding of a natural phenomenon strip away its miraculous qualities? It is certainly a risk. But it should at least maintain all of its poetry, for poetry subverts reason and is never dulled by repetition. Besides, a few gaps in our knowledge will always allow for a joyous confusion of the mysterious, the unknown, and the miraculous.

We all seek, more or less consciously, to increase our knowledge of the unknown—if only out of a lazy desire to turn something that once required thought into something that no longer does. We then use this knowledge to predict, from a safe distance, phenomena in a variety of fields and to produce more numerous and more fruitful hypotheses that we hope will finally explain Nature once and for all. It is the preservation of our species that is at stake and incites this eternal curiosity. But compared to Nature, Man's imagination produces weak revelations. Indeed, without our constant updating, the most stable or most perpetuated revelations are quickly erased, leaving us few clues about our evolution. Thus Man would give up all his powers of invention for the answers that Nature's creations seem to hold. This great passion of Man drives him irresistibly toward the origin of all things. Unfortunately, this search has led certain minds away from scientific inquiry to more or less voluntary self-delusion, though they may be motivated by deep conviction and a yearning for truth, rather than a desire for glory. But it is only when we recognize this need to understand do we realize the power the word *creation* has over us. Let us not confuse figments of the mind with actual experience. Instead, let's distract our insatiable curiosity for a moment with the simple contemplation of natural givens: subjects of wonder, charm, or horror, whose mystery seizes us when we seek to understand and identify with them.

It's no wonder the casual observer feels unsettled by the lack of order that seemingly rules over the planet's millions of animals. Our narrow minds need the comfort of carefully crafted logic and clear delineations.

But let's take a quick journey. It will be a disorderly one, but then again so are our subjects. We'll begin with the obvious observation that from the top of the food chain to the bottom, animals are always being eaten by other

animals. We then notice that certain foods, though very similar, seem to be more preferable or more suitable. The same goes for habitat. These subtle variations in food and environment have the power to play endless tricks on us.

We see animals that go from being oviparous to viviparous in response to mild temperature or abundant food. We see others that go from endlessly producing females—their successive generations fitting together like Russian dolls—to suddenly producing a male when faced with hunger or cold. We see males that are ridiculously dwarfish, whereas in a similar species they are magnificently built, vibrantly colored, and highly ornamented. While in most species the male dominates, there are cases—both among social and solitary animals—where the male's unpleasant fate is to be eaten or eviscerated by the female or condemned to die of hunger. There are females that continue to lay eggs throughout their lives next to legions of asexuals. Then there are cases of hermaphrodites that appear in some species at the onset of a new generation. Some just divide themselves in two, lengthwise or widthwise, others simply explode. There are eggs that are suspended in water but only develop if they are dehydrated by the sun or frozen. For some, fertilization occurs anonymously, water currents acting as the intermediary. For others, fertilization involves selection and combat. Sometimes it is the female who attends to her eggs; at other times, this service is performed by the male, who may even carry the eggs. (Every evening, Mr. Alytes, the obstetrician toad, comes to soak his packet of eggs.) In other instances, relatives entrust their offspring to the kindness of nature or simply drop them off with neighbors.

The subsequent development of the little ones offers just as many marvels. We see offspring who slowly substitute themselves for their parents by resorbing them; elsewhere, we see parents decompose in their children. We witness organs of propulsion becoming jaws, an eye passing from one side to the other or fusing to the one next to it; in some, all the organs disappear. While some young begin with identical forms, they grow into adults who look nothing like each other. So wildly different are the developmental stages in such a species that if one does not closely monitor their transformations, one

could be easily fooled into believing these two individuals are not even related. Indeed, a dully colored, carnivorous larva might grow into a dazzling colored vegetarian who, when fully grown, no longer has a mouth and fasts until its death.

The different ways animals protect themselves varies wildly too: they employ shape, surface, changes in color, stillness, curling up, shells, tubes, burying, disguise, flight, nails, beaks, pincers, claws, hooks, teeth, jaws, mandibles, spines, tentacles, odor, electricity, ink jets, etc.

And when they attack, we see more variations still. The very mobile carnivores each have their own way of lying in wait: a slow, creeping approach; hesitation; encirclement; or absolute motionlessness. In slow-moving animals, the stakeout is accompanied by the play of tactile organs that operate as a kind of warning. Though a stakeout always ends with an abrupt capture, the nature of the capture varies. The serpent crushes its prey in its coils before serving itself. The cat tears its victim apart and swallows feathers and hide. The duck seizes a snail in its bill and swallows it whole, dilating its esophagus in the process. The anteater, when it is tired, sticks its viscous tongue in a nearby anthill and withdraws it when it is covered with ants (who had unwittingly become stuck to it, having gathered around it to discuss its strange and sudden appearance). The toad snatches its prey dolefully while closing its eyes. The salamander tilts its head to the side as it contemplates a little worm crawling by, then slowly approaches it, coming within a millimeter, and finally lets loose in a skillful spasm. If a stickleback fish were to arrive at this moment, it might steal the worm but only swallow it halfway, appearing to be playing with it as it swims away. With eyes like two pivoting turrets in perpetual motion, the chameleon lances its prey with a certainty and a swiftness that belies its appearance. The dragonfly larva deploys its articulated mask and in a flash ensnares its prey between two hooks.

The water scorpion skewers its victim onto a pointed tip that serves as its mouth, then breathes it in with the aid of a piston. The larva of the dytiscid feeds itself in a similar way, though quite differently from the way the weasel

bleeds little mammals to death. The conger eel is like a pneumatic mail tube and can easily swallow a fellow conger, an octopus, and great quantities of small fish. The octopus casually dispatches a tentacle toward a slow-moving crustacean while it simultaneously shatters a few mollusk shells with its parrotlike beak. The starfish extends its stomach and envelops the most stubborn bodies, while the anemone uses its multiple, sticky little arms to slip all sorts of goodies into a single, wide opening that serves as both an entrance and exit. The angler fish, a vast sack of stuffing, awaits a tug on its fishing line, then closes its enormous mouth over creatures that are quite incapable of satisfying this digestion factory. The well-armed crustaceans are very fond of jujitsu with the twisting of claws—pulled off pincers rejuvenate, an antenna soon substitutes for an eye. A glowworm can inject a fluid into a mollusk ten times its size that will cause it to decompose in its shell and reduce it to an absorbable gruel. Those who are molting are in grave danger, for the loss of their shell leaves them soft for several days; malicious gossip has it that the reason the conger eel eagerly guards the lobster's home against the octopus is because it is waiting patiently for the lobster to molt in order to be able to eat it more easily.

But there are less violent habits: after skillful, slow-motion flight maneuvers, the carp louse lands on the backs of fish and fixes itself there in order to feed on the mucous secreted by their skin. Certain sea urchins endlessly scrape rocks for food, while others continuously swallow sand. Next to the strange and terrible parasites like the *Sacculina* (whose larvae affix themselves to a crab's shell then perforate it and dissolve through the crab to reemerge in the crab's abdomen in a form ready for reproduction), there are joyous commensals like the *Iulus* that, from its home on the shell of the hermit crab, slides between its host's claws and runs off with some lunch. We cannot forget the astonishing and insatiable cuckoo, its beak forever open, swallowing up all the food meant for the four little ones that it rushes out of the nest.

But all this action can be distracting and sometimes nothing is as astonishingly splendid as the most static forms of life, which allow us to dream each moment without imposing coherence on us. From the enigmatic facies of the cat to the sadness of the seahorse that has lost its arms; from the fireworks of a giant fan worm to the dance of the starfish; from the oblique walk of the crab to the balled-up attention of the spider; from the charming games of the otter to the ethereal pulsation of the jellyfish; from the color of butterflies to the song of birds; from mollusks that cover the sea with veils of blue to animals in the shape of leaves, branches, or flowers; there is an infinite field of magnificent and continual joys that prevents us from completely elucidating the mystery or the miracle.

INSTITUTE IN THE CELLAR

Léo Sauvage

Regards, 1935

Rue Armand-Moisant . . . 8 . . . 10 . . . 12 . . . Nothing. Yet I've written it down: 12, rue Armand-Moisant, fifteenth arrondissement. There is not a single respectable-looking building equipped with columns, university trappings, and inscriptions to which one might apply the name "Institute." Not a single modern box, with austere windows and geometric lines, that would suit a laboratory of scientific achievement. Oh, a movie theater. Today it's showing a film with sexy starlets. Jean Painlevé would not . . . Yes! There it is, the Institute of Scientific Cinema. Not in the theater where the seats are velvet and the loges expensive, but in a cellar where one must pass a suspicious concierge, a bell announcing us below. On the street, there is no sign. Restricted to initiates, no doubt.

A cellar staircase just like any other building in Paris. To the right, trash cans, a broom. At the bottom of the stairs, immediately to the left, in the area reserved for the building's owner, among the empty bottles . . . laundry. The Institute . . . On the ceiling, a tangle of electrical wires that descend into the cellar. The sound of a motor . . . The Institute of Scientific Cinema . . . Jean Painlevé is here, at the top of the stairs, his hand extended:

"I've been expecting you. Be careful not to break your neck.

"Let me show you the layout of the place. Try not to brush up against the walls, you'll get dirty. Here, to the right, my grand filming room. It's fairly small. It's where I spend most of my time. In the back, over there, you have a small dark room that also serves as an office."

. . . "In a pinch."

"Yes. Everything here is done in a pinch. Over there, to the left, is the machine shop, where all the instruments I need are fabricated or assembled. In the back, the menagerie . . ."

"Is that what the fence is for?"

"No, no. The fence is to separate us from the owner who dries his laundry back there. As for my menagerie, here it is . . ."

Jean Painlevé's "menagerie" is kept on a table, in a series of small bowls, basins, and plates. Some are covered with a thin wire screen. Painlevé care-

fully raises one of these screens. A small delicate animal, thin and elegant, receives the loving caress of his fingers:

"A branchiopod. The male is green, the female blue. They're very difficult to find! The dytiscids here are much easier to get. This is an extremely amusing animal, very modern. See there, on the stomach? It's an air sac. Defense liability, eh? I filmed their love life."

"And what about that one, who seems to be dragging a house behind him?"

"Ah, yes. We call him the 'Architect.' He builds his own house, and I assure you it's more sturdy than a lot of shacks in the area. It's made with tiny twigs, shells, and dirt."

We leave the menagerie and enter the machine shop. We meet Painlevé's collaborators. Albert, the shop mechanic, shows me the metal molds he has just cast. They are all adorned with the initials I.C.S. (Institute of Scientific Cinema). In front of some very complicated looking cameras stands André Raymond, Painlevé's oldest collaborator. He has just perfected a new apparatus for automatic filming. Raymond explains the details of it to me with volubility and pride. Painlevé listens, seemingly ready to tease him. But one can see, as Raymond gazes over the array of apparatus, that he is tender.

The filming room offers a spectacle as colorful as it is diverse. There is something bohemian about Jean Painlevé's Institute, something fresh, youthful, spirited, bustling, and unconventional that challenges the mummified science of the Academy in the most insolent way. The walls are white, covered with buttons, switches, levers, meters. How do they know what's what? And of these countless, inextricable wires that go in every direction, come back, entangle and separate, which goes to a projector, which to a camera, which to a socket? The shelves against the opposite wall typify the clutter and lack of space. They house the most diverse objects: cameras, lenses, microscopes, files, specimens, including the container that holds what Painlevé will present to us as his most prized possession: "the most beautiful infusorian flagellums in the world," as well as the handbag of the person Painlevé will introduce as his principal scientific collaborator—Geneviève Hamon.

Miss Hamon, in the corner, is in her domain. She presides over the microscope table. This table, cluttered with lamps and electrical apparatus of all sorts, sits beside a barrel that has been covered with a plank and faces a large sink, a few empty aquariums, a broom, and a garbage pail. I turn my attention away from the garbage pail and look into a microscope, where Miss Hamon has prepared something for us. Lights illuminate a backdrop of color, and at that very moment the specimen on the glass slide comes to life before my very eyes. I think of the Musée Grévin, where those willing to pay the price of a ticket are entertained by the play of light, mirrors, and a phonograph record. I peer once again into the microscope, realizing why Jean Painlevé takes such pleasure in his work.

I am stopped in my tracks, stunned, before a new apparatus for filming in slow motion that has recently emerged from Master Raymond's atelier. Painlevé explains how everything is made out of old things, refurbished and transformed. Thus one of the elements in the camera is a mechanism from a clock, bought somewhere at a discount. But it has been modified, a system of spare cogs adapted to it, allowing the recording speed to be changed at will. The camera is completely automatic.

Painlevé plugs it in, chooses the cog that he will place in the clock mechanism. Every twenty-five seconds, the light turns on, the shutter activates, and the film advances.

Varying the film speed is key to scientific cinematography. This is how Painlevé, in a report, describes it himself: "At twenty-four images per second, no perceptible change in the tissue culture; at one image per second, one sees the culture grow as the cells divide and the chromosomes cluster together, then separate; at one image per fifteen seconds, the culture grows very quickly, allowing one to clearly observe the cells passing through all the phases of division and whose chromosomes are agitated by such a rapid back-and-forth movement that one gets the sense of an accordion made of living matter; at one image per thirty seconds, one perceives only a general boiling of the cells and the construction of new tissue."

Glancing over at the large aquarium and one of the great difficulties of the work is quickly made apparent. The glass walls have shattered under the heat of six or seven lights.

"That was about 5000 francs," Painlevé tells us, "and this isn't the first time it's happened. Once I lost 10,000 francs and one of my collaborators had his thumb severed."

This is only one of the many problems. While Miss Hamon fishes out shards of glass that keep falling into the aquarium, threatening the family of newts, frogs, salamanders, and toads who live there, Painlevé speaks to me of the difficulties due to money (to do really good work, they would need a different camera for every project, but where to get the cash?) as well as the difficulties due to the subjects.

"These animals are mobile, capricious, and completely unconcerned with the way you wish to film them. So you must simply yield to them, bow to their whims. And then, be patient. I waited three days and three nights, taking turns with Raymond, for the seahorse to give birth. He was in no hurry. By the time he was finally ready, we had gotten skinny!"

We climbed back up the cellar stairs. We passed the garbage cans, the suspicious concierge, and the movie theater's sexy posters. We were on the rue Armand-Moisant, in front of no. 12. Neither dusty Institute nor hyped American box. Better than all that: a view into the future.

This page intentionally left blank

FEET IN THE WATER

Jean Painlevé

Voilà, 1935

In our decade-long effort to develop a technique for making documentary science films, Geneviève Hamon, André Raymond, and I have come up against thousands of obstacles. But life is kind. Aside from a few dead ends, each difficult or perilous situation has brought happy rewards.

In choosing the aquatic world as a field of investigation, we have encountered two problems, nonexistent elsewhere:

1. Establishing the basis for the study of aquatic animals which, unlike that of land and air animals, has so far been conducted in a summary and backward fashion.

2. Obtaining photographs that are as clear and illustrative as possible under the most realistic conditions.

Our investigations continue today and often give rise to surprising facts that contradict previous findings. With each new animal that we film, our technique is modified. Each shot takes into account an animal's individuality.

Whether shooting in freshwater or saltwater, light poses a delicate problem. As in all studios, various lighting sources—ambient and spot—are necessary to illuminate a specific area. After compensating for the reflections and refractions through the water or the aquarium's glass, the correct amount of light must be determined: there must be enough light to be visible on film without, however, bathing the animal in so much light as to affect its behavior.

Even in their natural surroundings, aquatic animals shun excessive light: they bury themselves in the sand, conceal themselves beneath algae, slip under leaves, hide in mud or under rocks. If in some cases they are attracted to strong light, it's only in the way moths are drawn to car headlights, and this type of behavior is not interesting. Some luciphiles, moreover, become luciphobes in captivity.

Putting aside the element of panic these animals often exhibit (which makes any mise en scène deceptive), let us simply consider their normal habits. With rare exception, there is little coherence in their movements.

Some display almost constant stillness, except during periods of sexual activity, punctuated with gestures of astonishing abruptness and speed. This would suggest very different shooting speeds. But if one films at high speed, the animal's movements will appear slowed down and artificial on screen. This artificiality is even more deceptive than if one shot at normal speed, obtaining clear footage only while the animal is immobile. These rapid changes, moreover, make it very difficult to focus.

Depending on the animal, other complications arise. For instance, aquatic insects suddenly fly away when roused by spotlights. Their larvae, after a violent struggle, die in terrible spasms, or so it would seem: moments later, they wriggle around as if nothing had happened. Hermit crabs withdraw into their shells when illuminated, indulging in intershell antics once they feel safe from prying eyes. When the lighting is changed—increased or decreased—some animals will switch directions, for example, descend when they had been climbing. Or a shrimp might vomit in front of the lens just when one expected the most ethereal ballet from it. (But then there was the great fan worm who spiraled its respiratory plume in and out of the tube in which it lived, happily giving a full demonstration for the camera: we have never been able to recapture the equivalent, either from the great fan worm or from its peers.) Animals who decorate their shells will suddenly stop when being watched. Or an octopus who constantly lifts everything that is around it, clouding the water with its groping tentacles, might, when one's back is turned, escape from the tank, flatten itself out, slip under the studio door and tumble out the window onto the embankment below to the surprise of bathers. Indeed, a moment's distraction and an expectant animal, whose labor has been under close observation for hours, might just liberate itself before one has had the chance to film it.

A year can be lost this way since certain phenomena take place only once a year and during specific times. Furthermore, finding the animals again is not always easy; they may have moved from their previous location. Once captured, they must be brought back alive. Those living in the depths of the sea may die when brought to the surface. Those living near the sea's surface

Jean Painlevé with electric generator, Brittany, 1928.

are very delicate and may die an hour after being taken from their environment, regardless of the precautions taken. Even among the more resistant animals, there are some that demand such a high degree of aeration in their artificial habitats that it is impossible to keep them alive long. Others require absolute cleanliness, also difficult to achieve. Finally, each must be fed a suitable diet in the proper conditions.

If, as recommended, vegetation is added to create a more natural environment, one must guard against the dangers that this vegetation can bring. Epidemics and deficiencies are common in even the best cared for animals who, in captivity, are deprived of tidal rhythms and their reproductive capabilities. Furthermore, light can incite combat between two males during fertilization or between animals deprived of natural food sources. Indeed, light often provokes such violence that it brings death to the actors, leaving the filmmaker without a cast.

Our first attempts to film the aquatic world involved the octopus as well as smaller animals: the sea urchin; the hermit crab; and, as representatives of

freshwater, the microscopic *Daphnia*, or water flea. One winter we secured two generators to a trailer, along with mercury lamps (which turned out to be completely useless), coal burning lamps, filament lamps, a remarkably shaped camera (resembling a Henri IV buffet), a microscope, an optical bench, a hoist, and electric cables—not to mention glassware in all shapes and sizes. We then hopped into a beautiful six-cylinder 1913 and hauled all 1,500 kilograms of this equipment to Brittany.

Our gear seemed to puzzle toll officials. Each time we encountered one of them during the night, we were forced to unpack and repack. It was below zero, but luckily the motor kept us warm. We made good time, and the road was wide open for us, thanks to the trailer that tended to lurch left and right, sometimes even swinging ahead of the car while making an impressive sound of shattering glass. Unfortunately, we wasted five hours fixing the alternator; its insulation had melted into the armature.

This was an attractive car: possessing low-beam headlights before anybody was talking about them in France. When it was given a new alternator, the car was in pretty good shape, though the second of its three gears was destroyed. Also, the exhaust pipe had an unfortunate tendency to heat up and one day slightly burned the floorboards and the clogs of the person above it. Then a fire started in the carburetor, which was put out with the pitchers of seawater we had just fetched from the shore, leading to complications from which this poor car has never fully recovered.

But two days after our arrival, the real problems began. We had left a seven-horsepower generator on the trailer so we could move it around more easily, but the heat it produced ruined some of our glassware. Then the generator stalled. When we restarted the motor we had forgotten that the dial was still on maximum voltage, causing a power surge that blew out the incandescent lights. Because we had ground the bearings during startup, the motor seized. The fireproof movie screen caught fire, and when fireproofing ignites, it really burns. Later, tiny grains of sand carried by a light wind settled into our water tanks, spreading over the organisms, and into the delicate gears of

the various precision instruments we had brought along. From then on, a slight but pervasive nervousness infused us all, which may explain why we kept breaking our glassware. As for the animals, at times there were so few of them we worked with anxiety, afraid of harming them. They had to be used immediately, the moment they were found, regardless of which film we were working on. It was a situation that led to much confusion when we later received the developed film: it was a jumble of mismatched scenes.

While animals are carried in by a great variety of distant tributaries, they are met with many causes of devastation in a fishing village: the yearly clearing of marine vegetation by farmers, abalone fishing, the discovery of fashionable new seafood "delicacies," the swarm of summer tourists. Indeed, the simple act of lifting a rock in low tide and failing to place it exactly where it was can cause damage. The rock, covered in algae, serves to protect a small pool beneath it from the sun. When exposed, the pool's inhabitants, along with anything living on the bottom of the rock, are destroyed. Further, anything living on top of the rock may have been crushed when turned over, and the vegetation between the ground and rock may begin to rot as well, preventing new life from forming around it.

Any subtle change in natural conditions can affect the whole of existence and lead to the decline or disappearance of a species for years. If parasites attack and kill the roots of the aquatic plants that grow amid the mud, the life that once sought nourishment there, or served as nourishment for others, or simply milled about in the mud's warmth, vanishes. Soon sand and pebbles invade these deserted places. Devastation is complete.

For ponds, weather is often the enemy. Certain animals lay eggs that need to be dried out before they can start to develop. If these eggs are laid during a rainy summer and the land remains soggy, they will not develop. If they face an arid summer and their pond dries up, the eggs can continue to develop provided it rains later. However, even if there is enough water for the eggs to completely develop, another dry spell at the end of the summer and the remaining water evaporates before the animals have been able to become

adults and reproduce. Thus, life at this particular place will be wiped out for years. Only a chance event like a great wind bearing a seed would be able to bring back the delicate and mysterious ferment of this species.

The job has its joys for those who love the sea. (For those, that is, who love the sea to the exclusion of all else.) Wading around in water up to your ankles or navel, day and night, in all kinds of weather, even when there is no hope of finding anything; investigating everything whether it be algae or an octopus; being hypnotized by a sinister pond where everything seems to be watching you even when nothing lives there. This is the ecstasy of an addict, the ecstasy of a hunting dog bounding across a field, crisscrossing it with euphoric expectation, even though each hidden crevice it stumbles over reveals, at most, a rotten potato.

Sometimes the pressing need for a specific animal will bring one into contact with professional fishermen whose lobster traps, treacherous lines, and large, devastating nets will present you with an unlikely bestiary—exactly what you requested.

There are so many myths to shatter! The most preposterous anthropomorphism reigns in this field: everything has been made for Man and in the image of Man and can only be explained in the terms of Man, otherwise "What's the use?" This leads to observations that are inaccurate. For example, under a rock there lives a lobster that would be eaten by an octopus if not for the vigilant conger eel who benevolently protects it. Yet we forget that when the lobster sheds its shell and is thus soft for forty-eight hours, this same conger eel will swallow it up without hesitation.

The great disappointment is the inability to immediately record unexpected events, rare and fleeting occurrences that leave one flabbergasted: a butterfly striking a female with its wings and treading upon her to give her a foretaste of home life; an octopus, swimming backwards, right into the mouth of a conger.

But there are consolations: the greatest being the ability to eat one's actors—crab, shrimp, sea urchins, squid, all finely cooked in new and unusual

Jean Painlevé and Geneviève Hamon collecting specimens, 1935.

ways. Of course, there is much to consider before tossing them in a pan. There are one hundred seven varieties of bouillabaisse to choose from. Should one use garlic or not? Prepare it au gratin? Sautéed in red wine? Add sardines? Classical gourmets may be offended, but the bouillabaisse of Marseilles cannot be imitated, so anything is allowed.

And so ten years have passed. Debts have been paid with the proceeds from lectures around the world, hundreds of them, sometimes three a day, and not always in the same town. Film canisters are not as hard as certain seats in third-class train compartments, which made me feel, upon arrival, as if I had just received a thirty-six-hour spanking. When out of politeness I attempted to speak the language of a country in Central Europe, my accent caused genuine hilarity. So just as the Odéon theater will restage the old standby *L'Arlésienne* when the cash box is empty, I reboarded the North Star train to revisit a country where the minds are as cultivated as the tulips.

In France, screenings in small villages often attracted hundreds of viewers, while in some major cities, they attracted only two dozen. The average, however, was about a thousand, despite the fact that in some places children were prohibited from attending. In Nice, a gentleman pretended to be me and wanted to deliver my lecture. Happily, we managed to come to an agreement; it was the only notable incident I have retained from these long tours.

After several years of working on strictly scientific or surgical films—which earn nothing, or rather, no more than public documentaries do, but at least they cost less!—we returned to our investigations and created a new group called "The Seahorse." (For those still interested in gastronomic matters, sad news: this creature can only be used as a toothpick.) This only proved that the difficulties continue. Whatever improvements had been made were quickly canceled out by new needs. Just like airplanes, the cameras we construct are obsolete the moment we try to use them. Microscopes, automatic lighting, and automatic cameras will soon have to undergo modifica-

tions due to the introduction of electromagnetic radiation that will make all instruments more sensitive.

The biggest problems often involve the smallest subjects. For example, insects such as the tiny dytiscid, which we used in the film *Freshwater Assassins*, were somewhat compromised. With bigger animals, success is a question of sheer willpower and tenacity. For *The Seahorse*, the enormous aquariums, which were made entirely of glass, shattered on two occasions—once exploding with such force that it flattened a crew member against the wall while glass shards shredded a bystander's shoes. Later, a person had his thumb severed by a water filter. In the midst of all this, the fish arrived early. It was an incredibly hot day, and so it was necessary to fashion a kind of hospital for aquatic victims of asphyxiation: a rubber tube attached to a bellows skillfully manipulated by foot—to avoid fatigue—sent air bubbling into the photography jars where a few male seahorses were temporarily lodging. They had arrived in a rusty tin of warm water and, luckily, had not yet given birth.

Later, when the artificial seawater spilled, all the spare parts lying on the ground were corroded. Not only did we have to overcome this unexpected inconvenience, we also had a camera platform with the fidgets. After thirty-six hours of waiting, immobile, hands on levers, watching for the liberating spasms of a male seahorse—we missed the first delivery, our reflexes dulled by mummification. After another forty-eight-hour wait, we were finally able to film a birth. The next three days were spent constructing a watertight case that enclosed a camera so that I could use it, along with a breathing apparatus, in the Bay of Arcachon. It was lovely; the underwater beauty seductive. It is easy to lose oneself in the water's depths.

So, in sum, just when you think you have finally perfected a technique, you are forced to change it. We now use color in some of our documentaries, just as cartoons do. And we now bring spotlights into the water with us. Through it all, however, we have kept the pioneers of film in mind: they exemplify the desire to press on, regardless.

A CLAY BLUE BEARD
Patricia Hutchins
Sight and Sound, 1938

Behind the latest experiment in puppet films lies a strange assortment of facts and personalities.

This color version of Perrault's *Blue Beard*, produced by the scientist Painlevé and realized by the sculptor René Bertrand and his children, is not a puppet film in the Pal, Starevitch, or "New Gulliver" tradition. In the use of a new plastic material to give a striking effect of three-dimensional reality, its deviation from accepted methods, and close study of natural movement, the film carries forward the work of many half-forgotten enthusiasts who foresaw the future of satire and fantasy in the cinema.

Since it was first published, in a rather shamefaced way, in the seventeenth century, the theme of Blue Beard and his murdered wives has known many vicissitudes. On the screen, these have varied from the hand-colored trick films of Méliès to the suave, divorce court sophistication across the water. This time Jean Painlevé has determined that its interpretation shall be as "far as possible from the spirit of American films," adding, significantly, "that it would be useless to compete in a genre where perfection has been achieved."

Charles Perrault is almost forgotten, and his stories of Mother Goose absorbed into the texture of many languages. This genial, indomitable littérateur, who, among other things, kept the Tuileries Gardens open forever in the interests of children, was described by Andrew Lang as "a born irregular, truant from school, deserter of the bar, an architect without professional training, a rebel against the tyranny of the classics, and immortal by a kind accident."

The fairy tales were written upon retirement and appeared under his son's name. They are an unrivaled combination of traditional storytelling with the shrewd observation of an old courtier, the candor and vivid imagery of a child's mind. The least supernatural, "Blue Beard" is in many ways a reflection of Perrault's own age. Its original text reveals an underlying satire on the bourgeois outlook of the time with its—not unfamiliar—preoccupation with gilded coaches and social precedence.

Music is of great, in fact, primary importance to M. Bertrand's film, which is based on a form of opera buffa. This was specially written by Maurice Jaubert, who considers this style more suited in many ways to the cinema than to the theater. The words are by Jean-Vincent Bréchignac and both music and film set out to guy the tragic manner.

Nearly two years ago, I found my way to René Bertrand's studio in Montparnasse. As he talked, I watched his three children modeling the figures that their small, skillful fingers would bring to life, movement by movement, before the camera. I stooped to examine the detail of a banqueting hall twelve inches high or stood before a trick table where medieval castle or crowded street scene was modeled entirely in plastiline.

A form of colored clay, plastiline can only be worked at night during very warm weather, and its effect of relief has given rise to many difficulties of lighting and perspective, to say nothing of the balance of color and smooth transition from one gesture to another. In the case of panning shots alone, it was necessary to use a studio in miniature with full lighting equipment to scale.

Whereas the usual method of cartoon or trick film is to substitute a different drawing or model for the phases of a movement or to suggest relative size, here the plastiline figure itself is changed, a process best described as "sculpting in place." Work is very slow, often not more than twenty frames a day, and retakes of a particular incident impossible as no detailed record can be made.

As a reward, the sculptor obtains results that are very different from the arbitrary movement of the cartoonist. René Bertrand has brought to this experiment his thorough knowledge of the analysis of movement, aided in particular by certain documents of Marey's to obtain the greatest precision. It will be remembered that Dr. Marey was one of the first Frenchmen to take an active interest in the film and in 1874 made a valuable study of human and animal movement.

A special camera for *Blue Beard* was devised by Jean Painlevé with the technical adroitness that underlies his brilliant documentaries of underwater life and lengthy list of film research in biology and physics. Last autumn, I was able to see several sequences from *Blue Beard*. These were of necessity disjointed and incomplete without the soundtrack, but they provided glimpses of a solid enough world in which, unembarrassed, the characters of a fairy tale had their being. Where permissible, color was used dramatically, but in certain scenes a subtlety and atmosphere was obtained, impossible to the black-and-white films of Ptusko and Starevitch or the neater, modern bathroom charm of George Pal's work—also in Gasparcolor—with its wooden soldier rhythm and deliberate flouting of reality.

SCIENCE FILM: ACCIDENTAL BEAUTy

André Bazin

L'Ecran français, 1947

The festival that has been least talked about, the one that has gotten the least publicity, mobilized the fewest millions and the fewest bottles of champagne[1] was also, unquestionably, the best of the year. It took place in Paris in a small 250-seat screening room at the Musée de l'Homme, where the International Association of Science Films held its three-day conference.

I am afraid that in 1948 Jean Painlevé will have to show his films on the lower level in the large screening room of the Palais de Chaillot, because word is getting out that microbes are the greatest actors in the world. Next year we will ask them for autographs. We already almost came to blows at the last few screenings, trying to squeeze ourselves into the little theater. We poor critics had come out in force. It is so rare to go to the movies for pleasure!

I see that you expect a definition of "science film" from me. Based on the program, I would have to say its domain extends from the destruction of the tsetse fly to facial surgery performed on casualties of war, from the sine curve of alternating currents to the biology of freshwater microorganisms, from the use of the circular loom to the underwater landscapes of Cousteau . . . And, in doing so, I would omit the actions of the coconut monkey, the division of sperm cells in grasshoppers, and the workings of radar. Jean Painlevé probably would not be one to question this eclecticism since he mischievously mixed into his program Arne Sucksdorff's admirable poetic documentary, *The Rhythm of the City*, under I do not know what fallacious but very agreeable pretext.

In truth, the bounds of the science film are as undefined as those of the documentary, of which we might simply consider it a more technical, more specialized, or more didactic offshoot. But, after all, who cares! The essential thing is not that we define science films but that we make them. Still, there is a "pure" variety among them that absolutely merits the name "science film": I mean those films in which cinema reveals that which no other procedure of investigation, not even the eye, can perceive. Thus, in filming yeast for his film *The Scientific Work of Louis Pasteur*, Painlevé discovered, upon high-speed projection, that yeast did not reproduce exactly as was thought. The

process is too slow for the eye, aided only with a microscope, to be able to sum up its successive phases.

Another very specialized genre is the surgical film. Thanks to it, the most exceptional and most delicate operations performed by the greatest surgeons can be repeated a hundred times for thousands of future doctors. I must say that they are always a huge success at the Musée de l'Homme. No one wants to admit that they "can't take it" and simply leave; after five minutes, you see viewers fall like flies and Jean Painlevé sipping neatly from his bottle of cognac. Of particular note this year: a wonderful American film on cosmetic surgery in which a face that had been completely crushed was literally reconstructed, and an astonishing Russian film in which a large intestine is transplanted as an artificial esophagus.

There is not enough room, unfortunately, to talk about the predispositions of the coconut monkey toward Euclidean geometry and Darwin's theories. And I assure you that it is a shame. But there is another aspect of the science film that I cannot neglect before concluding.

When Muybridge and Marey made the first scientific research films, they not only invented the technology of cinema but also created its purest aesthetic. For this is the miracle of the science film, its inexhaustible paradox. At the far extreme of inquisitive, utilitarian research, in the most absolute proscription of aesthetic intentions, cinematic beauty develops as an additional, supernatural gift. What cinema "of imagination" could have conceived of and produced the bronchoscope's fabulous descent into the hell of bronchial tumors, where all the rules of the "dramatization" of color are naturally implicated in the sinister bluish reflections of this visibly deadly cancer. What special effects could have produced the magical ballet of freshwater microorganisms, arranged miraculously under the eyepiece as if in a kaleidoscope? What brilliant choreographer, what delirious painter, what poet could have imagined these arrangements, these forms and images! The camera alone possesses the secret key to this universe where supreme beauty is identified at once with nature and chance: that is, with all that a certain tradition-

al aesthetic considers the opposite of art. The Surrealists alone foresaw the existence of this art that seeks in the almost impersonal automatism of their imagination a secret factory of images. But Tanguy, Salvador Dali, and Buñuel have only distantly approached the Surrealist drama in which the late lamented Doctor de Martel, preparing for a complicated trephination, first sculpts on the nape of a neck—shaved and naked as an eggshell—the outline of a face. Whoever has not seen that has no idea how far cinema can go.

It is in the understanding that the most skillful trephination can produce two simultaneous incommunicable and absolute postulates, namely, to save a man's life and to represent Père Ubu's lobotomy machine, that Jean Painlevé occupies a singular and privileged place in French cinema. His *Vampire*, for example, is at once a zoological document and the fulfillment of the great sanguinary mythology illustrated by Murnau in *Nosferatu*. It is not certain, unfortunately, that this startling cinematic truth can be widely accepted. It harbors too much potential scandal at a cost to current notions of art and science. This is perhaps why local audiences protested against and declared as sacrilege the jazz music that accompanies the little underwater dramas in Jean Painlevé's film *Freshwater Assassins.* So true it is that the wisdom of nations is not always able to recognize when extremes touch.

Notes

1. This is not a reproach. Moreover, I must add that the final cocktail party organized to celebrate the establishment of the International Association of Science Films was very delectable.

THE CASTRATION OF THE DOCUMENTARy

Jean Painlevé

Les Cahiers du cinéma, 1953

What is a documentary? "Any cultural film." "A nontheatrical film." "A short subject." "A reduced format film." That is just a partial list of answers international experts have offered. Faced with this confusion, the World Union of Documentary Filmmakers thought it worthwhile to formulate the following definition in 1947:

> Documentary: any film that documents real phenomena or their honest and justified reconstruction in order to consciously increase human knowledge through rational or emotional means and to expose problems and offer solutions from an economic, social, or cultural point of view.

Unfortunately, much time will pass before we can truly appreciate this definition and put it to use. In the meantime, audiences will mature while the documentary will degenerate. In the old days, the documentary was hissed at, scorned because of its noble pedigree (some unlikely third-rate films profited from this perception, though far less often than in today's glut and, moreover, those who used to make documentaries still had sincere intentions). Back then everybody, even the intelligentsia who frequented the so-called avant-garde movie theaters, complained about documentaries. "Oh no!" I once heard the former nursemaid of novelist Raymond Radiguet groan while sitting behind me at the Ursulines in 1927, "Another film by Painlevé!" Eventually it became fashionable to arrive late and skip the documentary altogether. Today, however, the man of taste who finds himself at a cinematic event feels compelled to applaud the documentary, no matter what it is, for he has finally learned—indeed, we have drummed it into him—that the documentary is cinema at its purest. There is even an elite that claims to like nothing but documentaries. Except for a few true cinephiles, it is precisely these documentary lovers who are the enemies of cinema. Still, all of them put together represent but a tiny segment of the moviegoing "clientele," or cinema's real market. We have even tried to widen our audience, but in doing so we have come to endorse the most disgusting type of conformity, and not just

to sell inferior merchandise. It is enough to make me start hissing myself, but that would give too much pleasure to those still contemptuous of the genre and who ignore the obvious fact that there are just as many lamentable feature films as mediocre documentaries. (And with the added decline of animation, despite technical innovations being employed in other genres, I often find myself waiting in anticipation for the intermission so I can view the next installment of the commercial "White Teeth.")

Currently, there are close to a thousand documentaries waiting to be released, clogging up the French market. (Those anxious to implicate me can relax: I have not made a documentary for a general audience in six years and therefore do not contribute to this bottleneck.) This glut of documentaries pending distribution can be explained not only by competition from other genres and foreign releases but also, and this may be the most important, by a cancerous proliferation of "short subjects" by beginners who view them as an easy way to get started. Some blame must also be placed on the relative ease in securing funding through private or governmental sources (although this is beginning to dry up). Even then, a documentary is an investment of the most risky sort, given the state of the market and the public's moviegoing habits. Documentaries not sponsored by the government or large companies risk early death. Indeed, to survive, a documentary is forced to become a public servant or a private one; that is, the filmmaker must walk a straight line. Given that the most banal and uninspired documentary, one that neither challenges the viewer nor drains the producer's money, already has difficulty making a profit, one can imagine what happens to innovative films: they are hidden away, treated worse than poor relatives who are at least tolerated. It is hardly an encouraging state of affairs for the rare producers, generally ex-filmmakers themselves, who want to support a quality effort. We need the genius of a Robert Flaherty or a Joris Ivens or the surprising novelty of a *Kon-Tiki* to break through the current barrier of indifference.

Money alone does not guarantee a successful film. It is the general public, the audience that keeps cinema alive, and they will only come for a fiction

film. A theater owner knows this and exploits it. Naturally he does not actually watch all the films that a distributor foists upon him: he has better things to do than waste time in a movie theater. Instead, he listens to what his customers tell him and studies the effects the films have on his neighborhood. This civic-minded gent might be fascinated, for example, with the effect a particular film might have on children. He determines, just by looking around, whether or not the week's movie appealed to children. When, after a certain movie called *Bloody City,* little boys began tormenting and knocking down little girls, he realized it was because they liked the movie. This well-informed man will never push for a documentary: it exhausts the mind when what people really want is to be entertained. Let us also not forget the distributor who is only interested in making money from a big film. There are so many obstacles. Yet these only partly explain the current deterioration of the documentary. The number of producers and filmmakers continues to increase (Do they believe in their own genius or in Father Christmas?), some lasting only long enough to cash their checks and deliver shoddy merchandise. One might, at first glance, view this profusion of films as a positive development: offering a variety of choices and a chance for a few flowers to bloom. Unfortunately, this is rarely the case since the conditions are fundamentally rotten (true not only in cinema, rest assured). Moreover, we have not been able to rid ourselves of such childish antics as distributing prizes at festivals that are not even organized by the profession, although some professionals do serve on the juries. (Nothing disgusts me more than a man of the trade getting mixed up with award ceremonies. As evidence, I point to a dilettante in the medico-scientific field: his first act was to create a "Grand Prize"—then promptly award it to one of his own films! This also brings to mind Anquetil, a great singer from the twenties, who founded the "Grand Prize of the Society of Nations for Virtue," and awarded it to one of his own books, a book, incidentally, whose tone of righteous indignation could not disguise its true subject: pornography.)

So a question arises: are filmmakers completely devoid of new ideas or are they just spineless individuals in the pockets of producers whose sole concern is commerce? Although it is not fair to demand that every film have the incisiveness of Georges Franju's *Hôtel des invalides*, the intensity of Marcel Zimbacca's *L'Invention du monde*, or the sweeping breadth of Albert Lamorisse's *Bim*, it is unthinkable that a filmmaker would have nothing to say about his subject. I hear some whisper that their subject was forced upon them—that is too easy. Others, lacking a better justification for their work, point to an alibi called "beautiful photography," which modern technology has made available to even the most ignorant amateurs. The unexpected, the unusual, the lyrical—all have vanished, replaced, I would argue, by "beautiful photography." So, for example, you can sit through an entire film about an abbey and still not know where it is located! Another formula that has become popular: rather than showing something, simply suggest it. "Close your eyes and imagine . . ." (A familiar refrain!) But we know better. We can get words without images from literature. At other times, we are invited to invisible battles, far away, to contemplate a hundred thousand men we cannot see. "What about poetic license, artistic liberties?" one might ask. That is not what is happening here. Rather, it is proof of cinematic impotence and fraud. It is also fraud, though it is often camouflaged as "reportage," to make a "documentary" about a country that ignores everything except secondhand reports from books or travelers. The element of adventure is stripped away in favor of a few exotic effects, and the subtle expressions of a country or population are reduced to poorly digested footage. Rivers, the sea, mountains, forests, animals, furry or fierce, are all slapped together to form a miniature eclectic bazaar, perfect for moviegoers hungry for shivers of fear or heroism while safe in their movie theater seats. Indeed, so artificial are these wild exploits, one expects them to culminate in an advertisement for a shirt that prevents rheumatism, or that the dead hero of Alphonse Daudet's *Port-Tarascon* will suddenly rise up and sing the praises of Mathurin spinach.

Nowadays just about anything is deemed a worthy subject for a film: the search for a missing person, a shipwreck, etc. Confusion reigns everywhere. Athletic feats pose as cinema. Filmed testimonials pose as sociology. Lines between different forms of media have been obscured as well: radio personalities now appear as television hosts; filmmakers now appear on radio.

At least the pioneers of cinema were more discreet. Think of Marquis de Wawrin's *In the Land of Headhunters* (Au pays du scalp), or Titayna's *Indians, Our Brothers,* or even the older *Symphony of the Virgin Forest* whose director, August Bruckner, died while making it. This is to be distinguished from the deplorable Nazi film *The Hell of the Virgin Forest*, which appeared seventeen years later in 1942 and whose wonderful sequence of a giant otter almost compensated for the paucity of the whole. Films with grand mise en scènes that were panned immediately such as Hoefler and Futter's *Africa Speaks to You* or Willard Van Dyke's *Trader Horn*—where, for the benefit of the camera, a guide was sacrificed to a rhinoceros—were no more artificial than certain recent much-ballyhooed "documents." (Despite the drama, conditions on reserves are actually less dangerous than a circus trainer in a cage of performing cats.) And if one looks to other documentary genres, one will discover young filmmakers worthy of a Marcel Ichac or a Jacques Cousteau have not yet given signs of life.

In all the imitators, one finds a complete lack of sincerity, inventiveness, and the energy necessary to capture difficult-to-achieve effects. At one time, some of them may have been innovators, but once a filmmaker repeats himself, his work loses its original purity and quickly becomes formulaic. Would it be so awful to try something new and original? After all, cinema is not cooking where warmed-up leftovers often taste better than the first time. I apply my argument to big movies as well. And why shouldn't I? Other critics have always applied their ignorance to all of cinema. One of them, in fact, discovered science films in 1951 through a Walt Disney film *The Little Corner of the Earth*, a charming though highly unscientific montage of images, some of which were sensational, but as for the whole, I can not remember a thing. Perhaps this young critic never considered the German UFA documentaries or

others that graced screens for twenty years and are still shown today from time to time, or, more recently, Soviet films, such as *Reanimation of the Organism*, *Sands of Death*, etc., which since 1945 have been well-received by all sorts of audiences. And when a critic praises Fred Astaire, is it for the charming *Gay Divorcée*? No, it is for the subpar *Top Hat*. And if another wants to recommend a tawdry musical—Oh great Armontel, what were you doing in one of these concoctions?—he can not use the excuse that *Tourbillon de Paris* is too old. Original and still fresh, it continues to be shown periodically, despite being fifteen years old. And when speaking of *The Spy*, no critic mentions the much superior *Lights* (Lueur).

Ever since Luciano Emmer and Enrico Gras created in 1941 the masterpiece *Earthly Paradise* based on a Bosch painting, others have tried to do the same. But for the most part, this practice is a form of misrepresentation, justifiable only in cases where the frozen action of a work—a painting, for example—is used to inspire a screenplay, as was the case when Alain Resnais, with much skill, used Picasso's *Guernica*. Otherwise, simply representing an artist's work is not a legitimate way to bring a painter back to life. What is unique to Van Gogh? That upon leaving a brothel, he cut off his ear? That his brother Theo may have been an awful man? I do not know, I have not ironed out my question, and I certainly do not want to make family dramas, I am simply trying to point out that even the most skillful montage of Van Gogh's paintings will not make the man come alive. Indeed, except for Resnais's excellent production, there have only been failures, useless and base efforts, films of disjointed cuts where among other things we see a raging sea, a ship, someone aboard singing the nursery rhyme "There was a small boat. . . ," then a palm tree (Martinique!), then someone singing "My sweetheart has left . . ." Lack of money cannot excuse this lack of imagination. And it is bad enough when paintings are filmed in black and white (The excuses? Cost, technical difficulties, incorrect rendering. Even so . . .), but it is made worse by a passionless narrator, some poor hack who has not studied, understood, or felt what he purports to be showing! We too often forget that while any subject

can be filmed, few are truly cinematic. You can tie your brain into a Louis XV knot trying, but you will still end up with a forgery.

Works such as Charles Dekeukeleire and Henri Storck's *Ancient Faces, Modern Faces* or Paul Haesaerts's *From Renoir to Picasso* proved that cinema could be used to present a thesis, though a viewer might not always agree with it. But this new use was quickly ambushed by the simplistic and pointless works that followed. And then there are those who have sought refuge in the once-marvelous genre of educational films, or those who have flocked to the medico-surgical field only to systematically bleed it dry. And do not think that a subject matter's technical nature precludes lyricism: see the impeccable *Circular Loom* (Métier circulaire) or the remarkable *The Jetty of Zonguldac* for just two examples of superior technical films. But like the shoddy documentaries made for mass audiences, most so-called specialized films also lack cinematic taste and the basic understanding of how to explain something to a general audience (whenever a documentary is made, one must determine for whom and why) and are devoid of any connection between filmmaker and subject.

Though expositional films can often fail, there is a subset that can succeed: those that are made for a cozy group of insiders, a coterie of initiates. These films, of course, require that viewers know all of an author's work (if the film is about a writer), the intimate details of his love life, and the underside of Parisian life in a bygone era. The uninitiated catch only fleeting flashes, illuminating . . . nothing! Sure, the film might touch a few hundred people living in the same mental landscape and displace a few thousand snobs, but what about the rest of the public? (This reminds me of traveling salesmen who trot out the same stories year after year, bursting into fits of laughter at the mention of a single word.)

Sure, it is easy to blame the producers, distributors, exploitative theater owners, the audience, etc., for all the evils, but ultimately it is the filmmaker who must take responsibility. Some plead the "I'm just trying to put food on the table" argument. Well, that argument has run its course: it is a cynical

rationalization, at least for those who only pretend to try to overcome difficult conditions in order to create influential work. There are those throughout our profession who make a living by this rationalization, even scorning it if necessary, as is the case with important playwrights and theater actors when they work in cinema. But there are others, those who press on despite the obstacles. I am addressing this minority in particular. You who do not practice the defeatist motto: "It's better than nothing"; you who have a strong enough cinematic eye to impose it on subjects you feel something for; you who will not agree to make a film about sugar production for the simple reason your grandfather was diabetic; you who scorn saccharine sentimentality and refuse to disfigure a work with it. It is you who hold the fate of the documentary—battered and bruised by a thousand blows from all sides—in your hands. But do not forget that a good theme is not enough to ensure a good film: the worst clichés will still kill it. Granted, except for a few rare and modest opportunities for technical or aesthetic research, the economic realities that currently affect French cinema will make it difficult for you to express yourself fully. But if, in the hope of finding provocative debate, you have read this far, all the way to the end of these intentionally polemic lines, then reread the definition at the beginning. You will find in it a solid framework for your film projects, one that will allow you to bring forth, with a clear mind, your ideas and desires.

This page intentionally left blank

THE TEN COMMANDMENTS

Jean Painlevé

from the program notes for "Poets of the Documentary," 1948

1. You will not make documentaries if you do not feel the subject.

2. You will refuse to direct a film if your convictions are not expressed.

3. You will not influence the audience by unfair means.

4. You will seek reality without aestheticism or ideological apparatus.

5. You will abandon every special effect that is not justified.

6. Trickery will be of no use unless the audience is your confidant.

7. You will not use clever editing unless it illustrates your good intentions.

8. You will not show monotonous sequences without perfect justification.

9. You will not substitute words for images in any way.

10. You will not be content with "close enough" unless you want to fail spectacularly.

SCIENTIFIC FILM
Jean Painlevé
La Technique cinématographique, 1955

The term *science film* refers to two different branches of cinema, each with its own mode of production and distribution: the popular film and the research film.

The popular science film, also called a "science documentary," is sometimes shown in a commercial theater when addressing a general audience, but when it is, it is usually because it is barely scientific at all. Instead, it treats its scientific subject matter superficially. At best, it will present a montage of brief, sometimes remarkable sequences in a delightful bazaar, a sort of sparkling five-and-dime store. The audience forgets what little it knows, but since this sort of film appeals to the senses and not to reason, it does make for a somewhat pleasurable experience. In other cases, the film might accompany a lecture and might even be shown first as a kind of lure, especially if the lecture topic is "exploration" or "ethnography." Such a film is often a collection of loathsome clichés served up by pretentious sorts.

When a serious production of a science documentary does come along, one that is free of demagoguery and explores a subject in depth—or is simply longer than two minutes!—it is considered anti-audience, geared toward specialists. This is understandable. For apart from a few cinephiles, the people who make it a point to see documentaries are not ordinary moviegoers. In fact, they are enemies of cinema: those who would not go out of their way to see "nonsense." If this tiny audience were the only one, film would not have emerged from the laboratory. Indeed, the film industry would not have been born.

Because this specialized audience is comprised of various levels of education, its understanding of science varies as well. While higher education or technical training may equip a viewer with skills similar to those required in scientific research, this is not so for primary or secondary education where *learning* often takes precedence over *understanding*. So although it would seem that film would be an educational tool well suited to our era, it is actually a double-edged sword: while film can spark an interest in a certain subject matter, it can also gloss over details and suppress curiosity by fostering the dangerous illusion that one has *understood*, when in fact, one has not.

Moreover, not every subject is suitable for a film: anything that distances one from the direct experience of something is mere counterfeit and should be avoided; nothing should be put on film that can be demonstrated either directly, on a blackboard, through a slide projector, with an epidiascope, etc.

Currently, most of the films used for educational purposes have been made by teachers for teachers with the students forgotten along the way. At best, they are a rehashing for an informed audience, a summing up of one's studies. But such is the current fashion—and a profitable one (many hope so, at least). Hence, a profusion of perfectly useless films as far as teaching is concerned.

It would never have occurred to the pioneers of cinema to dissociate research *on* film from research *by means of* film. But today, due to the evolution, sheer number, and growing complexity of the technologies involved, there are increasingly sophisticated distinctions between theoreticians, inventors, practitioners, and viewers. Indeed, superspecialized associations are forming, such as the one for endoscopic film (which is the exploration of the body's interior and organs through natural or surgical openings).

Furthermore, film research is, with few exceptions, the privilege of powerful corporations, without which new ideas are not able to come to fruition or be disseminated. The new idea that does gain attention may only be valuable in a commercial sense, spreading ridiculous fads, or rest on physiologically false principles (wide screens), or aesthetically bad ones (Polaroid reliefs), or misguided ones (the subtractive three-color process, when the clandestine two-color process was so beautiful!). All this time, tireless laboratory researchers have been banging their heads against the wall for decades studying ideas that may never find a commercial application (additive color, screen relief). From time to time, promising research does come along but is often abandoned, and if it falls into the public domain it is plucked out again under the threat of a lawsuit. Such is the state of research in general: only that which is profitable is allowed to exist. Consider the automobile industry. It must be at least fifteen years behind its potential.

Research aided by film, on the other hand, uses only proven technologies. It is simply a tool for researchers, the camera a convenient instrument, and therefore must present the fewest number of problems possible. Rare indeed are those willing to endure the initial problems involved with new technologies.

The capital outlay for equipment, film, and technicians is often so large that the individual again loses out to big organizations. And certainly the modest Institute of Scientific Cinema, which we founded in 1930 with scholars like d'Arsonval and Georges Urbain, cannot remedy the situation. Our only goals (and even these were too ambitious!) were to compare the viewpoints of practitioners and to bring scientific inventors together with those who use their technologies. There is still not much agreement among the work, and even if there were, the scientific community as a market is too restricted to trigger the manufacturing of new equipment.

There are also technical improvements that only come along gradually. For instance, we are still waiting for the automatic aperture, lenses with variable focus, and polychromatic lights that can be concentrated intensely and still be cool. The camera for high-speed shooting is excellent, but it only holds thirty meters of film: one has barely attained the desired speed when the film runs out. In addition, it only has three possible speeds, whereas one would like to vary the speeds. Overcoming many problems, moreover, requires a bit of tinkering, and that is often difficult to do when the equipment is old.

The Labrely-Debrie at 200 images per second continues to render good service, while the Merlin-Gerin at several thousand images per second looks promising. However, the success of modifying existing equipment—which has been helped along by AFNOR's major contribution of standardization—varies, depending on the set of problems that arise. The solutions sometimes are very different, even though the problems appear to be the same, as when the time span for shooting varies greatly: shooting for one hour or for one week raises very different problems.

The distribution of research films also presents problems. Many scientists distrust film, finding it expensive and unnecessary (when, in fact, if there were as many filmmakers as microscopists, there would be just as much valuable work). Above all, they fear (an inferiority complex, perhaps?) that their film will not be appreciated by an audience of nonspecialists; or worse, they themselves might be shown by a nonspecialist a documentary of superior quality! Despite this, we have managed to include a number of research films among the two thousand films from all over the world screened at the seventeen conferences we have organized with Dr. Charles Claoué since 1933 and at the nine conferences of the International Association of Science Films, which we founded with the Scientific Film Association of London in 1945 and which currently has eighteen countries as members. Two journals have come out of our work: *Science and Film* and *Bulletin de recherche*.

We choose films that result in a discovery or present an already-known fact in a new way. We try to respect all copyrights by insisting that a film's date be determined by its first public screening or by its first citation in a scientific publication. We deliberately turn down films that are simply rehashings or collections of obvious facts, blatant advertisements or self-promotions (which is frequently the case with industrial or medico-surgical films), and we do not allow ourselves to be impressed by "prizes" (which are often created by those who receive them!). Instead, we leave to others the truly childish behavior of establishing awards. Although we do not attach any importance to such awards, we are sometimes obliged to cite them. The advances in modern technology allow anyone to make a film: this does not mean, alas, that the resulting film will be of the slightest interest, nor that it was necessary to make . . .

The increased quality and stability of color results and the precision that measuring instruments provide when shooting now make color film essential to zoology, where sophisticated classification relies on color factors, as well as to spectrography, chemistry, histology, etc.

Clearly, the ever-increasing sensitivity of film, not to mention the sharpness and density of the grain, are key factors in the success of research film, as these developments eliminate many of the difficulties brought on by the use of excessive light. This sensitivity is also essential to high-speed shooting (a rate of about a million images per second can be attained on a short filmstrip with images in staggered rows, but only 5,000 images per second on 60 meters of 16 mm film). The success of high-speed shooting is contingent on an object's luminosity, and modern solutions ranging from the electronic flash to the wave train for brief, intense light are fundamental.

Sensitive ultraviolet film, combined with the mirror of a microscope, allows one to obtain the kind of amazing enlargements one gets with an electron microscope, but with live phenomena, which is not yet the case with the electron microscope alone. And with infrared film, one can film phenomena not visible to the human eye, to see beneath skin, to peek through veils of fog, to detect the roundness of the earth from high in the atmosphere. But can we call this a discovery? From a cinematographic viewpoint: Yes. Moreover, the are simple "filmed documents" that can be called discoveries—without using any special technology—for instance, films that show animal behavior in a stratospheric rocket. Perhaps a good physiologist-physicist could have predicted and described such behavior, but the proof, by experiment, is owed to film.

Originating as chronophotography from the work of physiologist Etienne-Jules Marey (who soon recognized all its applications), film is used to optimal effect in the unseen worlds of microscopy (whether it be ordinary microscopy, phase-contrast, or interference) as well as underwater. Movement—which is of course film's distinguishing characteristic—is studied in plants as well as in animals, but as in astronomy, time-lapse photography is generally required. By way of contrast, the filming of certain industrial phenomena such as arc welding or glass fusion requires high-speed filming. It is not always easy to find the optimum shooting system for the analysis of phe-

nomena. And recording the same phenomenon at different speeds sometimes prompts additional discoveries.

The sensitivities of sound recording and the excellence of output have, among other things, allowed one to record and study the faint sounds emitted by fish, or, combined with oscilloscopic patterns, to better understand the sounds of certain insects. Magnetic sound recording has supplied these improvements, for optical sound recording is limited. The same also applies to the magnetic image in relation to the optical image.

Sometimes the inherent qualities of a medium are only realized in stages. Thus, what characterized chronophotography seventy years ago was the instantaneous image, made possible by newly sensitive emulsions. Later, having evolved into cinema, it was the possibility of projecting an identical image for a large number of spectators and in different locations. But most important for the man of science, it was not only the analysis of images, as Marey practiced it, or the possibility of projecting images before several colleagues or sharing them with colleagues far away, but the ability to view repeatedly the same phenomenon captured permanently, an enormous advantage, especially when the phenomenon is rare and therefore difficult or expensive to reproduce. And now it is the role of the optico-chemical brightness and detail amplifier, detectable in every film, that every researcher calls upon. In 1948, for the first time in the world, we directly transmitted microscopy over television; if one filmed this televised image, one created a threefold enlargement: sharpness of detail due to the microscope, contrast due to the television tube, and general enlargement due to the film. Since then, this has been demonstrated many times.

But one of the most significant examples of the interaction of technologies comes from filmed radioscopy. One can capture X-rays directly onto film by recording their shadows, which are cast when X-rays travel in straight lines through a subject. The dimensions of the recording surface determine those of the surface recorded. For example, on 35 mm, one can record the entire heart of a tortoise but only the tip of a human heart. Balthazard in

1897, Lhomond and Comandon in 1910, and Thévenard in 1953 used this procedure. If one wants to capture a larger area, one must use a luminous intermediary whose rays are focused through the optics of a camera. In this case, a radioscopy screen is used, made luminescent by X-rays and focused through the lens, which Lhomond and Comandon did in 1925, as did Djan in 1934, among others. In 1955, Thévenard filmed the insertion of a ball behind the tongue of a sword swallower this way. But despite the aid of screens, the sensitivity of film, the quality of the X-ray tubes and the aperture, these exposures could only be of short duration or mediocre radioscopic output; otherwise, the patient would be put at risk. Although one was far from the dangerous dose of 95 milliamps used in 1925, the method had reached a dead end. It was then that the electronic brightness amplifier for radioscopy emerged: essentially a screen that, when under the influence of X-rays, emits electrons, which are accelerated by an electromagnetic field and strike a second screen with such violence that it becomes even more luminous than the first. In the French model, the image is still only 13 centimeters in diameter, but will increase. The brightness is such that one can even shoot at high speed and thus capture the heart in slow motion, for example, or with a dose of several milliamps, film a radioscoped observation for a very long time with no danger to either the patient or the equipment.

In endoscopy, cinema reached a plateau with Holinger's very cumbersome bronchoscope, which allowed for beautiful films in color but lacked depth of field. Since then, with Fourestier, Gladu, and Vulmière's universal endoscope (which has an external light source, thus the power one requires; its rays are conducted by a silica strip inside the body), one can film all endoscopies with an astonishing depth of luminosity. The resulting color films are of major importance for diagnostic as well as educational purposes. In radioscopy, some of the leading practitioners have amassed veritable film reference libraries. Now, direct observation is complemented by film.

These remarkable results must not let one forget the other researchers: Lucien Bull, who from 1910 to 1925, developed high-speed film that reached

1,500 to 25,000 images per second; Doyen, who began working in medical film in 1897; Comandon, who created filmed microscopy, among other things, and who collaborated with de Fronbrune to produce hundreds of world-renowned films depicting surgery on an amoeba's nucleus, mushrooms that strangle worms, and blood corpuscles dividing, to name a few; François Frank, who also dealt with a myriad of subject matter and whose newsreel, in 1907 I believe, depicted the development of a sea urchin's egg; Vles; Chevroton; Guilcher; Dragesco, whose remarkable films on microscopic unicellular organisms were made possible by the enlightened Professor Faure-Fremiet, whose laboratory at the Collège de France was home to numerous research filmmakers; Moricard, who dealt with embryogenesis; André Thomas, a specialist in tissue and organ cultures, and his colleague Montagnier, a cellular botanist; Blanc-Brude, who, working relentlessly and unaided, has obtained ever more beautiful photos of animal microscopy; Locquin, whose improvements and inventions have opened up new possibilities for the microscopic filmmaker; Bessis, the great blood cell specialist who has used ultramodern technologies from the beginning; Robineaux, whose every film reveals new advances and original subjects; Obaton, whose various films focus on botany and physiology; Le Blevenec, whose use of models and slow motion demonstrate advances in the study of harbors; the IRSID (Steel Industry Research Institute), which furnished an astounding document on smelting that only the camera could have made visible (the human eye would not have withstood it!); Farcy, who has made the most daunting industrial problems dynamic; Censier, whose remarkable documents on the French railroad have toured the world; Thomopoulos, in the study of the evolution of certain fish; Policard and Collet, who for years have analyzed the struggle white corpuscles wage against often deadly mineral dust; Vallancien, who has illustrated a theory of vocal cord vibration through high-speed shooting, a method also used by Piedelièvre to analyze blood drops and their significance to forensics, and again by Busnel in the study of ultrasonic cavitation and the stridulation of crickets, a study linked to his primary work in the acoustic

physiology of insects; Lyot, the great astronomer, whose invention of the coronagraph allows for the filming of solar flares, a source of inexhaustible interest; Leclerc, a maker of newsreels, but also a researcher of the heavens; Cousteau, the first filmmaker in the world to film hundreds of meters underwater with an aqua lung; and finally, the medical practitioners who, guided by the spirit of discovery and the quest for knowledge, are at the forefront of the use of film in research: Cherigie, Truchot, Porcher, Dubois de Montreynaud, and so many others, not to mention all the anonymous teams in industrial laboratories.

Scientific film has already been the honored subject of medical theses. Now it deserves a place in the official world of science, where it would have access to research facilities, equipment, assistants, grants and so forth. Scientific film requires study and instruction; it is not only a tool, but a grammar and an art.

JEAN PAINLEVÉ REVEALS THE INVISIBLE

Hélène Hazéra and Dominique Leglu

interview in *Libération,* 1986

A pioneer of science films, Jean Painlevé has managed both to fascinate men of science and move poets and cinephiles by revealing the once-hidden worlds of vampire bats, paramecia, water fleas, octupi, seahorses, and liquid crystals. Son of mathematician and politician Paul Painlevé, he has always been an independent thinker (a scientist once called him a "fantasist"), who teamed up with avant-gardists between the two world wars and cultivated anarchistic opinions while at the wheel of his Lancia or Bugatti.

Today, from a physical therapy clinic in the Hauts-de-Seine, Painlevé maintains his iconoclastic spirit. His conversation jumps quickly from pedagogical explanations on the habits of a wood parasite to amazing anecdotes: how he shepherded Eisenstein over the border in a bag of dirty laundry; how he showed his films to Joyce not realizing the author was blind; how the poet Max Jacob told him of jerking off all night to the sounds of lovers in an adjacent hotel room only to be told later by the hotel manager that the old woman in room five had died last night and that hopefully her cries hadn't disturbed him; how no one in France dared to discuss Leprince, the first man to project film, because he belonged to "a rotten branch of the Leprince-Ringard family."

Nothing seems to frighten Painlevé, not even death. "I almost died twice," he says. "I was nearly shot, and once I had a flat EEG during surgery." Is he joking or being modest when he says: "Every thing is the center of the world. I'm forced to be multicentric." He will be eighty-four next week—happy birthday, Mr. Painlevé.

Libération: Before making films, you took photographs?

Painlevé: I started taking pictures in 1910 with a Brownie number zero. It was a Kodak, a square box. But before that, I had a little 4 cm x 4 cm thing that I used to photograph the sun directly. I was always taking pictures. I photographed anything and everything that seemed curious to me. It's like kids today who fool around with computers to see how they work. What was surprising at the time was the "latent image": you could keep an imprinted image lying dormant and wake it up later. That's still an extraordinary thing.

Libération: How did you start out?

Painlevé: When I was twenty-one, I delivered my first paper at the Académie des sciences on observations of protoplasm. My future was all mapped out. Just to irritate everyone, I decided to become a film actor instead. At the time, film was frowned upon. I had met a certain Ernstein, who went by the anagram René Sti, who asked me to be in his film *The Unknown Woman of the Six-Day Race,* which was produced by Sapène, the director of *Matin*. His wife was in it. The film was supposed to benefit the Sorbonne's natural sciences laboratory, but Sti turned out to be a fraud; the film never came out. The script was completely worthless.

Still, the film taught me something. Some of its scenes were shot at the Six-Day Race in Paris; others were recreated in a studio. At the screening, the studio scenes looked real; those shot on location looked fake. It was so bad, I said to myself: I can do better than that!

I acted with Michel Simon—but if I start telling stories about him, I'll never stop. The cameraman was a guy named André Raymond. Like other cameramen, he'd get sixteen frames per second by turning his crank while singing "Sambre et Meuse." But he could also film one frame per turn, by disengaging the crank. That's what gave me the idea to make my first film *The Stickleback's Egg: From Fertilization to Hatching.*

Libération: Where was it shown?

Painlevé: It was a strictly scientific work and was shown at the Académie des sciences in 1928. During the screening, a botanist got up and declared: "Movies are not serious, I'm leaving!" In 1910, Dr. Comandon had already infuriated some academics by showing a film of the syphilis spirochete seen through a microscope. Eighteen years later, it was still scandalous to show "entertainment for the ignorant" to men of science.

Libération: What did your film involve?

Painlevé: I filmed stickleback embryos at different stages of development for

over a week. You could actually see a spermatozoid enter an egg, which was totally new, and how this fertilized egg formed its first cells and how these divisions changed over time. You saw the little cells that would later form the digestive tract, and the heart as it expanded over the vitelline membrane.

Libération: What do you think of it now?

Painlevé: I'm impressed (laughs). I've noticed some new things: in the tail of the fish, you can see that the blood flow is intermittent on one side, continuous on the other, which is a wonderful illustration of the difference between arteries and veins. It should be shown in schools.

Libération: During this time, didn't you also make a short film for a play by Ivan Goll?

Painlevé: Methuselah was a play in which short film scenes were subtly interspersed. At one point in the play, Madame Methuselah, dressed as a teapot, looks out a window and says: "Oh, a funeral!" Up in the loges, the Republican Guard sextet strikes up a fox trot by Maxime Jacob. Then the film begins and Artaud appears, as a bishop, following my Bugatti which had been turned into a hearse. The family of the deceased rides alongside on scooters, bickering. As with many of my films, the most wonderful parts occur off-camera. While we were filming at the Patte d'oie in Meudon, where we were sure we'd be left alone, two nuns came along with some young girls and kneeled down to kiss Artaud's ring. Artaud brandished his crucifix and yelled: "Get back, daughters of Satan!" They fled.

Libération: It seems you also have a more unpleasant memory of Artaud?

Painlevé: He stole the money for the film! A friend, Armand Moss, had given me the money. I planned to shoot some of the scenes outside, but for the others I had rented the Pathé studio on rue Francoeur. One morning, I went to pick up Artaud in my Lancia, and he saw me take out my wallet, stuffed with cash. His face melted in ecstasy at the sight of so much money. (He was a great actor!) We changed in adjacent dressing rooms at lunchtime. Later,

when I looked for the money to pay the studio and the actors, it was gone! In a panic, I gathered everyone together. "I can't pay you," I told them. "I've lost my wallet." Right then Artaud comes along, dressed as a big game hunter with a little goatee and cries: "I want—demand—to be searched!" Well, it hadn't occurred to me that he might be the thief, but he was. It was obvious. After that, Artaud avoided me. We lived on the same street at the time, and he'd cross to the other side whenever he saw me. But I continued to admire him and attend his performances. He was amazing. That was the only time I asked my father for money—and he gave it to me, no questions asked.

Libération: You were a long way from science films.

Painlevé: I've always mixed things up. Depending on the weather, sometimes I would drive sometimes I would fly. But since I was only an amateur pilot, the professional pilots would give me a hard time: puncture my tires, put iron filings in the carburetor. After one of my flights, if the spirit moved me, I'd go to the lab. When I would arrive at the presidential office in espadrilles and a cap, the guards would refuse to let me in. "Sure. We're President Painlevé's sons, too!" I had to go get the concierge. I was pegged as half-mad.

Libération: Why did you go from making films for scientists to making science films for the public?

Painlevé: To convey my passion for the octopus. It was a dream I'd had ever since meeting one during a childhood vacation in 1911. In 1925, during an internship at Roscoff, I would bring an egg to this octopus at 11:00 every morning. She soon began to recognize me by my shirt. Whenever she saw me, she turned black; the three layers of her skin—blue, red, and green—would swell with pleasure. Then she went off to eat her egg. We got along very well.

But then one day, out of perversity, I brought her a rotten egg. She turned totally white. In extreme fury, an octupus's cells contract and the white of the underlying dermis appears. With one of her tentacles, she threw the egg back at me over the aquarium's glass window. She never greeted me again. Instead, she'd retreat to the back of the aquarium and turn white. I

realized then she had a memory. This mollusk was as intelligent as a human.

Libération: Do you still think so?

Painlevé: To me, there is no difference between minerals, vegetables, and animals. They are all linked through evolution. There are parasites everywhere. Among humans: babies and old people. There are also temporary parasites: the ill and the crippled. I've managed to fit into both categories. All it takes is one atom to go and stick itself in 2-3 [Dear readers, consult your physics and chemistry textbooks—Ed.] to become a parasite of a system. This is how we get gold, diamonds, oil, asbestos. It's a continuous evolution.

I'm very proud that we live in an era that finally recognizes its dependence on shit. All of genetics relies on colon bacilli, which in turn rely on our feces. All experiments are done on it. We're deep into the shit.

Libération: You seem to have earned an amusing role in the history of Surrealism. Thanks to your father's position, you were able to get the Surrealists released whenever they were carted off to jail for their scandalous behavior. Is this a myth?

Painlevé: There are lots of myths. They weren't carted off to jail all that often. One thing is certain though, Breton couldn't stand that I had worked with Ivan Goll, who was the first person—even before Apollinaire—to use the word *Surrealism.* I collaborated with Goll because his little play seemed like fun—not because I was against the others. But for the Surrealists, there were clear divisions: you were either a core member, a fellow traveler, or an enemy. And the strange ways these divisions manifested themselves were quite something.

One day, walking along Clichy square, Breton found himself leading the usual cast of characters—the Prévert brothers, half a dozen other guys—when he came across an innocent couple taking a stroll. It was raining lightly and the man was carrying an umbrella. Seeing it, Breton rushed up to the man and said: "Don't you realize you're a complete idiot with that umbrella!" The man

protested. Pedestrians gathered. A policeman intervened. Breton said, "Don't you see that this man has an umbrella?" The policeman, being cautious, decided that everyone should follow him to the station.

Breton and the officer led the way, followed by Jacques Prévert and the guy with the umbrella. Jacques, with startling determination, clawed at his own face until it bled. "Officer," he cried out. "Look what this idiot did to me with his umbrella!" As the officer turned around slowly, Breton leapt back, seized the umbrella, broke it in two, and threw it in the gutter.

Libération: Let's go back to your science films.

Painlevé: The Octopus was screened at the Diamant movie theater, which belonged to the producer Henri Diamant-Berger. He only used my films as opening acts for his. I would yell at him, but my films were never moneymakers. The only popular success I've known was with *The Seahorse*. People talked about it on the bus: "Did you see that movie about the male who gives birth?" "Oh, I've known about that for a longtime." The film cost 100,000 francs to make and earned the same amount. It was the only film that ever broke even. Then I invested in costume jewelry—necklaces, bracelets, and belt buckles in the shape of seahorses—which I made and were sold in eleven boutiques in France. From a Czech engineer, I bought the patent for a monomolecular gilding process which required only a very thin layer of gold. It was rustproof, even in seawater. The whole thing was wildly successful until the end of the war restrictions. But my partner made off with the cash, fleeing to Monaco where we couldn't extradite him. I had gotten into the bad habit of filming without accounting, and found myself broke.

Libération: Another famous film is *The Vampire*, which you shot at the very beginning of World War II. Some have said this documentary about a blood-sucking bat is an allegory for Nazism.

Painlevé: Of course, the vampire's salute! [*The small animal stretches out its wing in Hitlerian fashion*—Ed.] The guy who brought it to me at the

Pasteur Institute had fed it lamb for a month. The vampire bat hates lamb. He didn't like the guinea pig he sucks on in the film any better. He attacked it in a very unorthodox manner. Normally, it bites the feet of its victims. Here, it was the snout. We kept the bat for about two weeks, but when war was declared, we gassed it. A bomb could have fallen on the Institute and freed the vampire which was a carrier of infectious disease.

Like all the petit bourgeois, I was an anarchist and took part in anti-Nazi demonstrations. Even though I was an anarchist, the only commissioned film that I've ever made, *French Solutions*, was for Giraudoux's Ministry of Propaganda in 1939.

Libération: Describe *French Solutions*.

Painlevé: It showed that France was not only an agricultural country as Nazi propaganda had depicted it, but an industrial power as well. During the World Fair, the most powerful lighthouse lamp in the world (500 million candles) had kept the entire neighborhood of Champ de mars from sleeping. The light had streamed through the shutters. We wanted to film this lamp in Ouessant. After verifying our credentials, a guard led us to the lamp. It was still packed in an enormous crate. There was no electricity in Ouessant! French solutions are always a bricolage, so, undeterred, we decided instead to film the biggest transatlantic harbor station in the world, at the tip of Grave, facing Royan. When we arrived, however, the whole thing was closed down. We called maritime headquarters and they told us: "It is out of commission! It's covered in sludge. Break the lock and take the key." Any shrimp fisherman knows that sludge seeps into everything, but did the station's architect know this? Obviously not. Later the government would spread the rumor that in fact it was a secret submarine base bombed by the Nazis in 1940.

When *French Solutions* was completed, I didn't want to give it to the Pétain authorities, so I was condemned for withholding money from the State. After the Liberation, when I became director of cinema, at the urging of the Liberation Committee I handed over the film. And still I was fined! Condemned by Pétain, executed by de Gaulle (laughs).

Libération: You were active in the Resistance, but you don't like to play the war veteran.

Painlevé: I hate that sort of thing. I witnessed some very disgusting things. I wasn't part of any network: whenever there are more than two people, someone is always threatened. But I will tell you a funny story that I've never told anyone before. Commander Barba, who led the Calabrian troops, had given me a map of the hidden network of tunnels in Cavalaire. I wanted to pass it on to a journalist friend. But Nice was swarming with police, so it was impossible to talk freely. Thankfully, Henri Salvador came to the rescue. He played the drums in a café in Masséna square, and he played them deafeningly loud. So my journalist friend and I took a seat next to the drums and there we could talk. I don't know what she did with the map, but there were no deaths in Cavalaire—except for two dwarf hairdressers buried in a trench.

Libération: Is music important to your work?

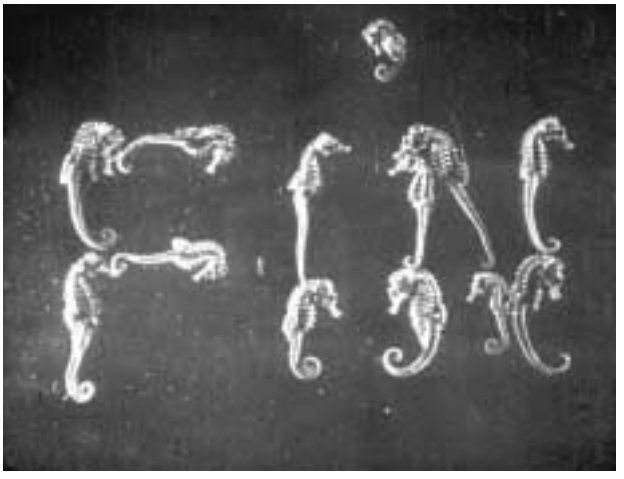
Painlevé: As a child, I used to fool around on the piano. I made my instructor teach me fox trots which I'd play at family gatherings. At the Jockey on boulevard Montparnasse, I banged out a few tunes with the singer Kiki and also with Chiffon. The men made fun of Chiffon because she cried all the time. One day she threw herself into the Seine. I played "Balloon," "Les Petits Chevaux de bois," and "Dardanella." I also tried to play Satie and Albeniz. Varese once told me that *Rhapsody in Blue* was actually a schmaltzed up version of a score he had lent Gershwin.

When I met the vampire bat, I had Duke Ellington's "Black and Tan Fantasy" and "Echoes of the Jungle" in mind. It was the first time jazz music was used in a science film. For *The Seahorse*—which contains the first underwater footage captured in a diving suit—Darius Milhaud's score was mediocre: at the time, he was working at the Pathé studio playing sausage music. The music by Maurice Jaubert though was wonderful. He was a friend of mine. For the film *Acera*, Pierre Jansen wrote the music instantly: he'd only seen the film once.

I asked François de Roubaix for a musical score that I would, for the first time, synchronize images to. He asked to see one of my films—*The Love Life of the Octopus* with music by Pierre Henry—and apparently thought I wanted that kind of music. Then he died while diving in the Azores. His father later brought me a tape. At first, I didn't know how to use his work. And then, by cosmic chance, it was perfect for *Liquid Crystals*.

Libération: Your science films have three versions. Why?

Painlevé: Because audiences are different. This raises the issue of "vulgarization," or, to use the English word which I prefer, "popularization." A film dealing with scientific subjects always risks being too sophisticated for one audience and too superficial for another. The scientist knows his subject matter and is protective of it. But an ordinary moviegoer can't always rise to that level, which is perfectly understandable. So with my films, I made one version for scientists, a second for universities, and a third, which was shorter and set to music, for general audiences. You must sort out your audiences. But the real question is: is it your right to do this or is it your obligation?



SELECTED FILMOGRAPHY

As an Actor

The Unknown Woman of the Six-Day Race (L'Inconnue des six jours). 1926, unfinished.
35 mm, b & w.
Directed by René Sti.
Cameraman: André Raymond.
Props: Geneviève Hamon.

Methuselah (Mathusalem). 1927. 35 mm, b & w, silent, 7 min.
Directed by Jean Painlevé.
Music: Maxime Jacob. (Added to later version.)

Popular Films

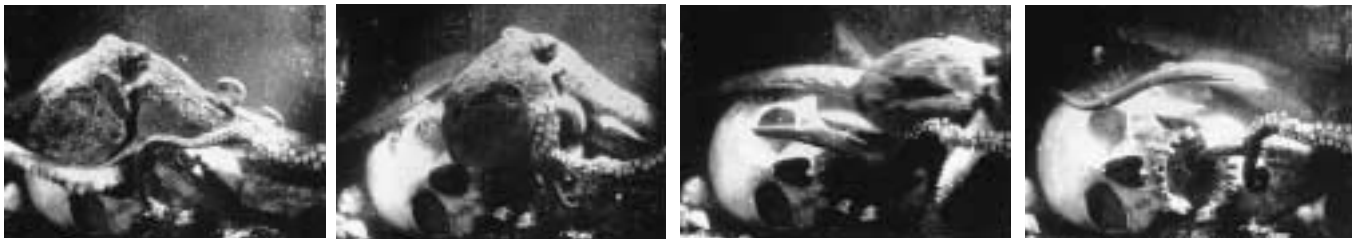
The Octopus (La Pieuvre). 1928. 35 mm, b & w, silent, 10 min.
Cameraman: André Raymond.

The Daphnia (La Daphnie). 1928. 35 mm, b & w, silent, 13 min.
Cameraman: André Raymond.

The Sea Urchin (L'Oursin). 1928. 35 mm, b & w, silent, 10 min.
Cameraman: André Raymond.

The Hermit Crab (Le Bernard-L'Ermite). 1929. 35 mm, b & w, sound with intertitles, 13 min.
Music: Vincenzo Bellini, orchestrated and conducted by Maurice Jaubert.
Cameraman: André Raymond.

Hyas and Stenorhynchus (Hyas et sténorinques). 1929. 35 mm, b & w, sound with intertitles, 13 min.



The Octopus, 1928.

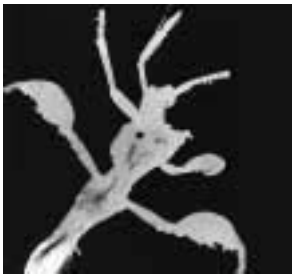
Music: Chopin, orchestrated and conducted by Maurice Jaubert.
Cameraman: André Raymond.

Calder's Mobiles (Les Mobiles de Calder). 1930. 35 mm, b & w, silent, 10 min.

Crabs (Crabes). 1930. 35 mm, b & w, sound with intertitles, 8 min.
Music: Maurice Delannoy, orchestrated and conducted by Maurice Jaubert.
Cameraman: Eli Lotar.

Shrimps (Crevettes). 1930. 35 mm, b & w, sound with intertitles, 10 min.
Music: Maurice Delannoy, orchestrated and conducted by Maurice Jaubert.
Cameraman: Eli Lotar.

Caprella and Pantopoda (Caprelles et pantopodes). 1930. 35 mm, b & w, sound with intertitles, 9 min.
Music: Scarlatti, orchestrated and conducted by Maurice Jaubert.
Cameraman: Eli Lotar.



Caprella and Pantopoda, 1930.

The Lobster (Le Homard). 1930, unfinished. 35 mm, b & w.
Cameraman: Eli Lotar.

The Spider (L'Araignée). 1930, unfinished. 35 mm, b & w.
Cameraman: Eli Lotar.

The Seahorse (L'Hippocampe). 1934. 35 mm, b & w, sound, 15 min.
Music: Darius Milhaud.
Narrator: Ben Danou.
Cameraman: André Raymond.

Voyage through the Sky (Voyage dans le ciel). 1937. 35 mm, b & w, sound, 10 min.
Produced by Jean Painlevé.
Directed by Achilles Pierre Dufour.
Music: Jean Yatove and Van Hoorebeeke.

The Fourth Dimension (La Quatrième Dimension). 1937. 35 mm, b & w, sound, 10 min.
Produced by Jean Painlevé.
Directed by Achilles Pierre Dufour.
Scientific advisor: Henri de Sainte-Lagüe.

Struggle for Survival (La Lutte pour la vie). 1937. 35 mm, b & w, sound, 14 min.
Produced by Jean Painlevé.
Directed by Achilles Pierre Dufour.
Scientific advisor: Henri de Sainte-Lagüe.

Similarities between Distance and Speed (Similitudes des longueurs et des vitesses). 1937. 35 mm, b & w, sound, 12 min.
Produced by Jean Painlevé.
Directed by Achilles Pierre Dufour.
Scientific advisor: Henri de Sainte-Lagüe.

Blue Beard (Barbe bleue). 1938. 35 mm, Gasparcolor, sound, 13 min.
Produced by Jean Painlevé.
Directed by René Bertrand.
Clay animation by René Bertrand and his family.
Music: opera buffa by Maurice Jaubert.
Lyrics: Jean-Vincent Bréchignac.

French Solutions (Solutions françaises). 1945. 35 mm, b & w, sound, 22 min.
Music: Maurice Jaubert.
Narrator: Claude Darget.
Cameraman: Maillols.

The Vampire (Le Vampire). 1945. 35 mm, b & w, sound, 9 min.
Music: "Black and Tan Fantasy" and "Echoes of the Jungle" by Duke Ellington.
Cameraman: André Raymond.

Our Planet Earth (Notre planète la terre). 1946. 35 mm, b & w, sound, 18 min.
Produced by Jean Painlevé.

Our Planet Earth, 1946.

Directed by Achilles Pierre Dufour.
Music: Guy Bernard.

Freshwater Assassins (Les Assassins d'eau douce). 1947. 35 mm, b & w, sound, 25 min.
Music: "Mahogany Hall Stomp" by Louis Armstrong; "Drop Me Off in Harlem," "Slippery Horn," and "Stompy Jones" by Duke Ellington; "Wire Brush Stomp" by Gene Krupa; "Rhythm Spasm" by Baron Lee; "White Heat" by Jimmie Lunceford.

The Scientific Work of Louis Pasteur (L'Oeuvre scientifique de Louis Pasteur). 1947. 35 mm, b & w, sound, 33 min.
Codirected with Georges Rouquier.
Music: Guy Bernard.
Cameraman: Marcel Fradétal.

Blood of the Beasts (Le Sang des bêtes). 1949. 35 mm, b & w, sound, 21 min.
Directed by Georges Franju.
Narration written by Jean Painlevé.

A Notation for Movement (L'Ecriture du mouvement). 1949. 35 mm, b & w, sound, 15 min.
Music: Pierre Conté.
Cameraman: Marcel Fradétal.

Sea Urchins (Oursins). 1954. 35 mm, color, sound, 11 min.
Music: organized noise in homage to Edgar Varèse, and "The Real Mambo."
Cameraman: Claude Beausoleil.

Calder's Circus (Le Cirque de Calder). 1954. 35 mm, color, sound, 30 min.

The Strange World of Axel Henricksen (Le Monde étrange d'Axel Henricksen). 1955. 16 mm, color, sound, 15 min.
Music: Pierre Maillard-Verger.

Sea Ballerinas (Les Danseuses de la mer). 1956. 35 mm, color, sound, 18 min.
Music: Pierre Conté.

How Some Jellyfishes Are Born (Comment naissent des méduses). 1960. 35 mm, b & w, sound, 14 min.
Music: Pierre Conté.

Dance Repetitions for *Calendal* (Répétition de danses pour *Calendal*). 1964. 16 mm, color, sound, 16 min.
Staging: Jean Descamps.
Choreography: Pierre Conté.
Music: Pierre Maillard-Verger.

Shrimp Stories (Histoires de crevettes). 1964. 35 mm, color, sound, 13 min.
Music: Pierre Conté.
Narrator: Le Brun.

The Love Life of the Octopus (Les Amours de la pieuvre). 1965. 35 mm, color, sound, 13 min.
Music: Pierre Henry.
Narrator: Clairval.

Iron Filings (Limaille). 1970. 35 mm, color, sound, 5 min.
Music: Super Bastringos.

Acera or The Witches' Dance (Acéra ou Le Bal des sorcières). 1972. 35 mm, color, sound, 13 min.
Music: Pierre Jansen.

Diatoms (Diatomées). 1973. 35 mm, color, sound, 17 min.
Music: Pierre Anglès and Roger Lersy.

Marey, the Unappreciated Scientist (Marey, un savant trop méconnu). 1976. 35 mm, b & w, sound, 20 min.
Produced by Jean Painlevé.
Directed by Pierre Thévenard.

Liquid Crystals (Cristaux liquides). 1978. 16 mm, color, sound, 7 min.
Music: "Antarctica" by François de Roubaix.

Pigeons of the Square (Les Pigeons du square). 1982. 35 mm, color, sound, 28 min.
Music: Ramon de Herrera.
Cameraman: Vincent Berczi.

Research Films

The Stickleback's Egg: From Fertilization to Hatching (L'Oeuf d'épinoche: De la fécondation à l'éclosion). 1927. 35 mm, b & w, silent, 25 min.

enlarge
45% to fit

Cameraman: André Raymond.
(Based on research by Professor Wintrebert and Young Ko Ching.)

Vibratory Cilia (Cils vibratiles). 1927. 35 mm, b & w, silent, 16 min.

Protoplasm Movement in the *Elodea canadensis* (Mouvement du protoplasme d'*Elodea canadensis*). 1927. 35 mm, b & w, silent, 18 min.

Dr. Normet's Serum (Le Sérum du Dr. Normet). 1930. 35 mm, b & w, silent, 10 min.
Cameraman: André Raymond.

The Corrective and Reconstructive Surgery of Dr. Claoué (Chirurgie corrective et réparatrice du Dr. Claoué). 1930. 35 mm, b & w, silent, 18 min.
Cameraman: André Raymond.

Nativelle Digitalin (Le Digitaline Nativelle). 1934. 35 mm, b & w, silent, 18 min.

Tissue Cultures and Macrocytes (Culture de tissus et macrocytes). 1935. 35 mm, b & w, silent, 10 min.
(A collaboration with Dr. J. André Thomas.)

Heart Culture of a Chicken Embryo (Culture du coeur d'un embryon de poulet). 1935. 35 mm, b & w, silent, 11 min.
(A collaboration with Dr. J. André Thomas.)

Microscopy on Board the *Théodore Tissier* (Microscopie à bord du *Théodore Tissier*). 1935. 35 mm, b & w, silent, 15 min.

Total Eclipse of the Sun on June 19, 1936 from Kharkov (Eclipse totale du soleil du 19 juin 1936 à Kharkov). 1936. 35 mm, b & w, silent, 10 min.
Produced by Jean Painlevé.
Directed by Joseph Leclerc.

The Formation of the Alps (La Formation de la chaîne des Alpes). 1938. 35 mm, Gasparcolor, sound, 15 min.
(A collaboration with Professor Léon Moret.)
Claymation by Achilles Pierre Dufour.

Jean Painlevé filming plastic surgery by Dr. Charles Claoué, 1930.

The Corrective and Reconstructive Surgery of Dr. Claoué, 1930.

Chloroplast Phototaxis (Phototaxie des chloroplastes). 1953. 16 mm, b & w, silent, 10 min.
(A collaboration with Professor Luc Montagnier.)

Eleutheria: *E. Dichotoma* and *E. Claparedei* (Eleuthéria: *E. Dichotoma* et *E. Claparedei*). 1955. 35 mm, b & w, silent, 16 min.

Influence of Light on the Development of Trout Eggs (Effet de la lumière sur le développement des oeufs de truite). 1956. 16 mm, b & w, silent, 13 min.
(A collaboration with J. Thomot.)

Embryogenesis of the Dogfish (Embryogénèse de la roussette). 1957. 35 mm, b & w, silent, 13 min.

Halammohydra. 1958. 16 mm, b & w, sound, 18 min.
(A collaboration with Professor B. Swedmark and Professor G. Teissier.)

Dr. Penchenat's Physical Therapy Method and Massopratic Table (La Méthode de kinésithérapie et table massopratic du Dr. Penchenat). 1958. 16 mm, b & w, silent, 26 min.

Some Types of Leptonacea (Quelques types de Leptonacées). 1959. 16 mm, color, sound, 22 min.
(A collaboration with Gilbert Deroux.)

Division and Movement of the *Oryzias latipes* Egg (Division et mouvement de l'oeuf d'*Oryzias latipes*). 1959. 35 mm, b & w, sound, 20 min.
(A collaboration with Yasuhiko Kanoh.)

The Bourgeoning and Growth of Colonies of the *Bryozoa chilostomata* (Le Bourgeonnement et la croissance des colonies chez *Bryozoa chilostomata*). 1960. 35 mm, b & w, sound, 15 min.
(A collaboration with Geneviève Lutaud.)

Total Eclipse of the Sun on June 19, 1936 from Kharkov.

The Shrimp and Its Bopyrus (La Crevette et son bopyre). 1961. 16 mm, color, sound, 13 min.
(A collaboration with Catherine Tchernigovtzeff.)

Some Ciliated Protozoa of the *Geleia* Type from Arcachon (Quelques ciliés holotriches mesopsammiques d'Arcachon, du genre *Geleia*). 1969. 16 mm, b & w, sound, 18 min.
(A collaboration with Michel Nouzarède.)

Teredos (Les Tarets). 1969. 16 mm, color, sound, 50 min.
(A collaboration with Alexander Cantacuzène.)

Dr. Parrel's Speech Therapy Method (Méthode orthophonique de Dr. Parrel). 1972. 16 mm, b & w, sound, 102 min.

***Hemioniscus Balani* (*Hémioniscus Balani*).** 1972. 16 mm, color, sound, 18 min.
(A collaboration with Marie Helène Goudeau.)

Nematic Textures in Liquid Crystals (Cristaux liquides: Textures nématiques). 1972. 16 mm, color, sound, 86 min.
(A collaboration with Dr. Yves Bouligand.)

Molting, Copulation, and Hybridization in Lobsters (Exuviation, copulation, hybridation chez les homards). 1975. 16 mm, color, sound, 18 min.
(A collaboration with Michel Léglise.)

SELECTED TELEVISION AND RADIO PROGRAMs

Television Programs

"Jean Painlevé: The First Television Experiment" (Jean Painlevé: Le Premier Essais à la télévision). French Public Television, 19 June 1948.

"Under the Microscope." BBC, London, 7 July 1948.
Produced by A. Miller Jones.

"Live Endoscopy" (Endoscopie en direct). French Public Television, 24 February 1956.

"Live with Jean Painlevé" (En direct de chez Jean Painlevé). By Igor Barrère and Etienne Lalou. French Public Television, 12 January 1959.

"The Modern Adventure" (L'Aventure moderne). By Jean Bardin and Bernard Hubrenne. French Public Television, 19 April 1963.

"Salute to Adventure" (Salut à l'aventure). French Public Television, 14 September 1966.

"Saga: Jean Painlevé or The Invisible in Images" (Saga: Jean Painlevé ou l'invisible en images). By Marie-Luce Staïb and Claude de Givray. French Public Television, 25 September 1984.

Jean Painlevé: Along the Thread of His Films (Jean Painlevé: Au fil de ses films). A series of eight 26-minute programs for French Public Television, 1988.
Coproduced by ARTE, Les Documents Cinématographiques, and GMT.

Radio Programs

"Discussion on Speech Therapy" (Causerie sur l'orthophonie). Radio Paris, 10 October 1936.

"Jean Painlevé at the Radio-Cité Microphone" (Jean Painlevé au micro de Radio-Cité). Radio-Cité, 20 May 1939.

In the Land of Discovery (Au pays de la découverte). A series of "sound documentaries" for French Public Radio, October 1945–November 1946.
Directed by Albert Riera.

Sound effects by Henriette Roget.

"Struggle for Survival" (La Lutte pour la vie).

"Our Planet Earth" (Notre planète la terre).

"Conceptions of the World" (Les Conceptions du monde).

"Birth throughout the Animal World" (Naissances à travers le monde animal).

"Pasteur."

"The Tides" (Les Marées).

"Insects, Masters of the World" (Les Insectes, maîtres du monde).

"The Death of Stars" (La Mort des étoiles).

"The Oceans" (Les Océans).

"Underwater" (Les Sous-L'Eau).

"The Peril of Man and the World" (Péril des hommes et du monde).

"The Goals and Projects of UNESCO" (Buts et travaux de l'UNESCO). French Public Radio, 24 July 1946.

"Ciné-Club Activities" (Activités des ciné-clubs). French Public Radio, 13 October 1947.

"The Sea Bestiary of Jean Painlevé." By John Madison. BBC, London, 20 December 1949.

"Homage to Maurice Jaubert" (Hommage à Maurice Jaubert). French Public Radio, 15 June 1952.

"Homage to Marey" (Hommage à Marey). French Public Radio, 14 May 1954.

"The Usefulness and Role of Cinémathèques" (Utilité et rôles des cinémathèques). French Public Radio, 24 January 1955.

"To Know Cinema" (Connaître le cinéma). French Public Radio, 17 March 1970.

"Cinémagazine." French Public Radio, 20 April 1974.

"Afternoons with France-Culture" (Les Après-Midi de France-Culture). France-Culture, French Public Radio; 11 May 1977, 2 February 1978, 26 February 1982.

"Cinéromans: The Lives of Jean Painlevé" (Cinéromans: Les Vies de Jean Painlevé). By Philippe Esnault. France-Culture, French Public Radio, 24 August 1982.

"Cinéromans: Science and Fiction" (Cinéromans: Science et fiction). By Philippe Esnault. France-Culture, French Public Radio, 25 August 1982.

Memories of the Century (Mémoires du siècle). By Brigitte Berg. A series for France-Culture, French Public Radio, 6 December 1988.

SELECTED WRITINGS BY JEAN PAINLEVÉ

"Neo-Zoological Drama" (Drame neo-zoologique). *Surréalisme*, no. 1 (October 1924).

"An Example of Surrealism: The Cinema" (Exemple de surréalisme: Le Cinéma). *Surréalisme*, no. 1 (October 1924).

"Why I Make Films" (Pourquoi je veux faire du cinéma). *Soir* (14 January 1928).

"The Biology Film" (Les Films biologiques). *Lumière et radio* (11 September 1929).

"Science and Cinema" (Science et cinéma). *La Revue du médecin*, no. 3 (December 1929).

"The Beauty of Documentary Film" (Beauté du film documentaire). *Monde* (18 January 1930).

"Marine Photography" (Photographies marines). *Art et industrie* (12 October 1930).

"Will the Documentary Always Be Treated As a Poor Relative?" (Le Film documentaire sera-t-il toujours traité en parent pauvre?). *L'Effort cinégraphique suisse* (January 1931).

"On Maintaining Intertitles in Sound Documentaries" (A propos du maintien des sous-titres dans un documentaire parlant). *T.S.F. programme* (3 January 1931).

"Mysteries and Miracles of Nature" (Mystères et miracles de la nature). *Vu* (29 March 1931).

"In the Land of the Headhunter" (Au pays du scalp). *Monde* (6 June 1931).

"Cinema Today: On George Altman's Book *That's Cinema!*" (Le Cinéma aujourd'hui, Sur le livre de Georges Altman: *Ça, c'est du cinéma!*). *Monde* (27 June 1931).

"Cinema in the Service of Science" (Le Cinéma au service de la science). *Revue des vivants*, no. 10 (October 1931).

"Soul of the Researcher" (L'Ame du chercheur). *Vu* (13 January 1932).

"A Curse! The Colorado Beetle" (Une Calomnie! A propos de la leptionarse). *Vu* (20 January 1932).

"Scientific Overview" (Tour d'horizon scientifique). *Vu* (1 June 1932).

"Preparing for a Good Birth" (La Préparation à bien naître). *Vu* (14 December 1932).

"The End of Robots" (La Fin des robots). *Vu* (1933).

"The Redemptive Scalpel" (Autour du bistori rédempteur). *Le Phare d'eneuilly*, no. 1 (1933).

"Scientific Film: Filming through a Microscope" (Le Cinéma scientifique: Microscope et prise de vue). *Le Cinéma privé*, no. 1 (October 1933).

"Filming through a Microscope: Practical Applications" (Microscope et prise de vue: Applications pratiques). *Le Cinéma privé*, no. 2 (November 1933).

"Three-Dimensional Film" (Le Relief en cinéma). *Le Cinéma privé*, no. 7 (April 1934).

"The Problem with Science Documentaries" (Le Problème du documentaire scientifique). *Vu*, special cinema issue (December 1934).

"Feet in the Water" (Les Pieds dans l'eau). *Voilà* (4 May 1935).

"Television" (La Télévision). *La Revue du cinéma educateur* (July–September 1935).

Review of *Man, an Unknown* (*L'Homme cet inconnu)*, by Dr. Alexis Carrel *Vendredi* (29 November 1935).

"Animal Life: Common Crabs and Shrimps" (La Vie des animaux: Les Vulgaires Crabes et crevettes). *Le Journal magazine* (15 February 1936).

"Living Underwater" (Vivre sous l'eau). *Marianne* (15 April 1936).

"Science and Educational Film" (Le Cinéma scientifique et d'enseignement). *Ciné-Liberté* (1 November 1936).

"Child Psychology Films" (Les Films psychologiques de l'enfance). *L'Hygiene par l'exemple*, no. 2 (November–December 1936).

"Evolution" (L'Evolution). *Le Musée vivant*, special edition (September–October 1937).

"Diving" (En plongée). *Instruire et plaire*, no. 1 (October 1938).

"On the Documentary" (Du documentaire). *Pour vous* (2 November 1938).

"Fakery in the Documentary" (Du faux dans le documentaire). *Instruire et plaire* (December 1938).

"How Cinema Reveals the Invisible" (Comment le cinéma nous révèle l'invisible). *Le Figaro* (3 November 1939).

"On the New Realism in the Art of Fernand Léger" (A propos d'un nouveau réalisme chez Fernand Léger). *Cahiers d'art*, no. 3–4 (1940).

"A New Battle between Old and New: The Film That Will Not Be Shown at Cannes, *Farrebique"* (Une Nouvelle Bataille d'Hernani, Le Film qui ne sera pas montré à Cannes: *Farrebique). Les Etoiles* (24 September 1946).

Introduction to *French Science Film* (*Le Cinéma scientifique français*), by P. Thévenard and G. Tassel. Paris: Editions La Jeune Parque, 1948.

"Cinema in the Service of Science Teaching" (Le Cinéma au service de l'enseignement et de la science). *La Nation belge*, Brussels (9 January 1948).

"Meeting Jean Vigo" (Rencontre avec Jean Vigo). *Ciné-Club*, no. 5 (February 1949).

"A Filmmaker Has Visited the Slaughterhouses: *Blood of the Beasts* will now be submitted to the reactions of the public" (Un Cinéaste est allé aux abattoirs: *Le Sang des bêtes* va maintenant affronter les réactions du public). *Le Figaro littéraire* (13 August 1949).

"Cinema, Science, and Teaching" (Cinéma, science et enseignement). *L'Education nationale*, no. 15 (April 1951).

"We Have Come a Long Way since the Underwater Club" (Depuis le club des sous-l'eau, nous avons fait un long chemin sous la mer). *La Vigie marocaine*, Morocco (21 October 1951).

"The Problem with Ciné-Clubs" (Le Problème des ciné-clubs). *L'Ecran français* (18–24 April 1952).

"On Science Film" (A propos du cinéma scientifique). *Problèmes* (May-June 1952).

"The Castration of the Documentary" (Castration du documentaire). *Les Cahiers du cinéma*, no. 21 (March 1953).

"Scientific Film" (Le Cinéma scientifique). *La Technique cinématographique* (1955).

"Eric von Stroheim." *Les Lettres françaises*, no. 671 (May 1957).

Foreword to *Game of Seven Errors* (*Le Jeu des sept erreurs*), by H. Blanc et Ami. Paris: Editions Julliard, 1963.

"A Little-Known Pioneer of Scientific Film: Lucien Bull" (Un Pionnier trop peu connu du cinéma scientifique: Lucien Bull). *La Tribune de Genève* (17 June 1966).

"A Comparative Analysis of Color Film Emulsions" (Sur l'appréciation comparative d'émulsions cinématographiques en couleur). *Le Technicien du film*, no. 159 (April–May 1969).

"Scientists As Filmmakers and Filmmakers of Science" (Scientifiques cinéastes et cinéastes scientifiques). *Cinémaction* (1986).

"Why Do You Make Films?" (Pourquoi filmez-vous?). *Libération*, special edition (May 1987).

SELECTED WRITINGS ON JEAN PAINLEVÉ

Hervieu, Marcel. "The Infinitely Small Revealed by Microcinema" (L'Infiniment petit révélé par le microcinéma). *Je sais tout* (1929).

Lazareff, Pierre. "In the Service of Science: How Jean Painlevé Makes His Interesting Underwater Documentaries" (Au service de la science: Comment Jean Painlevé tourne ses intéressants documentaires sous-marins). *Cinémonde* (25 April 1929).

Cassou, Jean. "Underwater Art" (L'Art sous-marin). *Art et décoration* (1 May 1930).

"Jean Painlevé's Film." *New York Times* (29 June 1930).

Michaut, Pierre. "Science Film: The Work of Jean Painlevé" (Le Film scientifique: Les Travaux de Jean Painlevé). *Cinéma* (1 November 1931).

Werrie, P. "Science Film: The Documentary Work of Jean Painlevé or the Highest Form of Cinematography" (Le Film scientifique: L'Oeuvre documentaire de Jean Painlevé, ou la plus haute forme du cinématographe). *Le Vingtième Siècle*, Brussels (23 December 1932).

Lot, Fernand. "The Microcinematography of Vital Phenomena" (La Microcinématographie des phénomènes vitaux). *Le Miroir du monde* (14 October 1933).

Reyna, Fernando. "Enchantment at the Bottom of the Sea: The Love Life of the Seahorse" (La Féerie au fond des mers: Les Amours de l'hippocampe). *Vu*, special cinema edition (15 December 1934).

S. H. K. "Recording the Sea-Flea's Heart Beats: A New Field for the Camera." *Photography* (January 1935).

"The Film Festival and Jean Painlevé's Underwater Films" (El congreso cinematográfico y los films submarinos de Jean Painlevé). *La nación*, Buenos Aires (6 January 1935).

Reyna, Fernando. "Painlevé's Underwater Photographs" (Las fotografias submarinas de Painlevé). *Estampa*, Madrid (26 January 1935).

Sauvage, Léo. "Jean Painlevé or Subversion in Science: The Studio of Underwater Stars" (Jean Painlevé ou la subversion dans la science: Le Studio aux vedettes sous-marines). *Regards* (April 1935).

Sauvage, Léo. "Institute in the Cellar" (L'Institut dans la cave). *Regards* (10 May 1935).

Sauvage, Léo. "With Jean Painlevé: Incursion into Underwater Life" (Avec Jean Painlevé: Incursion dans la vie sous-marine). *Regards* (June 1935).

Coifman, I. "The Pregnant Male on the Screen: *The Seahorse"* (Il maschio incubatore allo schermo: *L'Ippocampo)*. *Sapere*, Rome (15 June 1935).

Werrie, P. "The Hippocampus or Seahorse" (L'Hippocampe ou cheval marin). *Le Vingtième Siècle*, Brussels (23 June 1935).

Browne, Mallory. "The Underwater Club." *Christian Science Monitor* (October 1935).

Berger, M. H. "An Inventor of Apparatus, Mr. Jean Painlevé" (Un Inventeur d'appareils, M. Jean Painlevé). *Le Fascinateur*, no. 332 (January 1936).

Jacoupy, Jacqueline. "Cinematographic Personalities: Jean Painlevé" (Figures cinématographiques: Jean Painlevé). *Revue du cinéma educateur* (January–April 1936).

Reyna, Fernando. "Wonders of Science Cinematography: The Film *Voyage through the Sky"* (Maravillas de cinematográfico scientífico: La pellicula *Viaje por el cielo)*. *La nación*, Buenos Aires (24 January 1937).

Gautier, Jean-Jacques. "How One Passes from *The Seahorse* to *Blue Beard"* (Comment de *L'Hippocampe*, on passe à *Barbe bleue)*. *Echo de Paris* (16 February 1937).

Michaut, Pierre. "At the Exhibition of Paris 1937: A Flowering of Documentary and Science Films" (Autour de l'exposition de Paris 1937: Floraison de films documentaires et scientifiques). *Pour vous* (1 April 1937).

Hutchins, Patricia. "Painlevé, Scientist and Filmmaker: A Survey of His Contribution to Educational Cinema." *Sight and Sound* (summer 1937).

Hutchins, Patricia. "A Clay Blue Beard." *Sight and Sound* 7, no. 26 (Summer 1938).

"From *Freshwater Assassins* to Spies of the High Seas" (Des *Assassins d'eau douce* aux espions de haute mer). *L'Ecran français* (21 July 1946).

Hutchins, Patricia. "From China to Peru: An Account of Some Films Seen in France." *Sight and Sound* 16, no. 61 (spring 1947).

Sadoul, Georges. "Jean Painlevé and the Ciné-Clubs" (Jean Painlevé et les ciné-clubs). *L'Ecran français* (10 July 1947).

Bazin, André. "Science Film: Accidental Beauty" (Le Film scientifique: Beauté du hasard). *L'Ecran français* (21 October 1947).

Fritsch, Wilma. "French Film in the Service of Science" (Französischer Film im Dienst der Wissenschaft). *Blick in die Welt* (December 1949).

Madison, John. "The World of Jean Painlevé." *Sight and Sound* 19, no. 6 (August 1950).

Tosi, Virgilio. "An International Cinematheque for Science Films" (Una cinémathèque internazionale per i films scientifici). *Cinema*, Rome (1 December 1950).

Goldsmith, Maurice. "Thanks to the Camera, Science Penetrates a New World" (Grâce à la caméra, la science pénètre dans un monde inconnu). *Le Courrier de l'Unesco* (September 1951).

"Jean Painlevé and the Direction of Science Film" (Jean Painlevé et l'orientation du cinéma scientifique). *Science et vie* (March 1953).

Calvero. "The Documentary Film Festival" (El festival de cine documental). *Marcha*, Montevideo, Uruguay (18 June 1954).

Battisti, Carlo. "Nature and Cinema in Jean Painlevé's Work" (La natura e il cinema nell'opera di Jean Painlevé). *Il giornale del mattino*, Italy (25 April 1955).

Philipe, Anne. "Cinema and the Popularization of Science" (Cinéma et vulgarisation scientifique). *Les Lettres françaises* (16–22 May 1957).

"I Interviewed Jean Painlevé" (J'ai interviewé Jean Painlevé). By Henri Gaubert. *Naturalia* (June 1957).

"For the Filmmaker Painlevé, His Stars Are Measured in Millimeters" (Pour le cinéaste Painlevé, les vedettes sont millimetrées). *Télémagazine* (11–17 January 1959).

"Jean Painlevé Reveals the Invisible" (Jean Painlevé qui fait voir l'invisible). Interview by Hélène Hazéra and Dominique Leglu. *Libération* (15–16 November 1986).

Henri, Jean-Jacques. "Jean Painlevé: First to See" (Jean Painlevé: Voir d'abord). *Les Cahiers du cinéma* (September 1989).

Hazéra, Hélène. "Jean Painlevé: Science and the Image" (Jean Painlevé: La Science et l'image). *Positif* (February 1990).

Ahlgren, Calvin. "'Poet of Invisible' Unveils Nature's Secrets." *San Francisco Chronicle* (7 July 1991).

Simon, Jason. "Jean Painlevé and Mark Dion." *Parkett*, no. 44 (1995).

Grafe, Frieda. *A Poacher: Jean Painlevé 1902–1989* (Ein Wilderer: Jean Painlevé 1902–1989). Basel, Switzerland: Editions Stroemfeld, 1997.

The folowing pages are a series of postcards sent to Jean Painlevé by Sergei Eisenstein during his travels to the United States and Mexico.

reshoot showing outer border of post-card

Tell your translator-friend of the great Shaw that at this moment I am thinking about his words concerning this

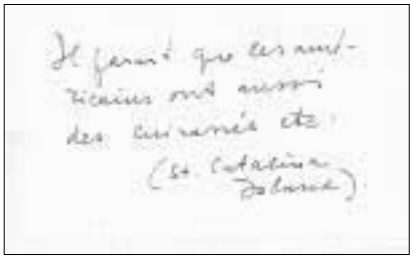
On board the *Europa*, New York, 12 May 1930

Dear Painlevé!
I am so sorry for not having seen you before my departure, but it all happened in such a hurricane! (like everything else in my life). Accept then all my best wishes while gazing upon this pretty curio here.
Yours always,
Eisenstein

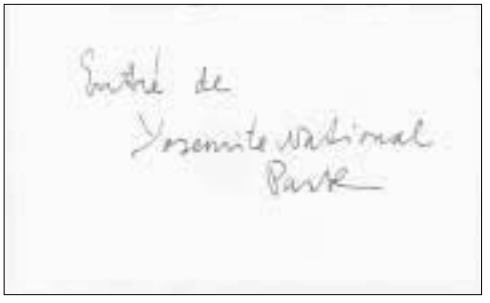
On route to Hollywood

All my affection from New Mexico and Arizona.
13 June 1930
Eisenstein

Here are some more foul creatures for the making of films! (Santa Catalina Island)



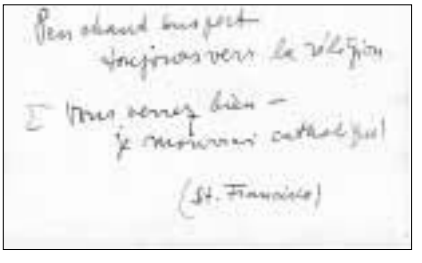
It would appear that the Americans also have some battle-ships etc. (Santa Catalina Island)



Entrance to Yosemite National Park

This is more or less the moral state to which one is reduced in Hollywood!
(Between us—so as not to upset the U.S.A.!)
(Death Valley)

Very Dear Friend!
The zig-zag of my travels leads me to Mexico where I feverishly await your news—by the way—you have not responded to me for a long time.
Nevertheless, yours always
Eisenstein
Mexico, D.F. Caille de Niza 47



Still a suspicious penchant towards religion.
(You'll very well see—I'll die a Catholic)
(San Francisco)

CONTRIBUTORs

Andy Masaki Bellows is the publisher of Brico Press and also works for City Lights Books in San Francisco.

Brigitte Berg is the director of Les Documents Cinématographiques in Paris, an independent archive founded by Jean Painlevé in 1930 that houses his work as well as the work of other international filmmakers from the early development of film to the present.

Jeanine Herman is the translator of numerous French-language books including *Two Sisters and Their Mother* by Françoise Héritier, *Laure: The Collected Writings*, and *Archeology of Violence* by Pierre Clastres. She lives in New York City.

Marina McDougall is a curator who initiated the first U.S. retrospective of Jean Painlevé's films in 1991. Ms. McDougall has worked with the Exploratorium in San Francisco, the Museum of Jurassic Technology in Los Angeles, and currently the California College of Arts and Craft Institute for Exhibitions and Public Programs in San Francisco.

Ralph Rugoff is an independent curator, art critic, and the author of *Scene of the Crime*, *The Eye of the Needle: The Unique World of Microminiatures of Hagop Sandaldjian*, and *Circus Americanus*. He currently lives in London.

ACKNOWLEDGMENTs

Foremost, we would like to extend our utmost gratitude to Brigitte Berg of Les Documents Cinématographiques in Paris, our vital partner on this project. Ms. Berg collaborated with Jean Painlevé in his final years, and since his death her energy, passion, and devotion has enabled his work to live on. This book and the appreciation of his work throughout the world today would be inconceivable without her.

We would like to thank Marie Bursztyn-Berg who helped us with the difficult task of scanning the 35 mm film prints in New York. Generous support in this regard was also given by Rick Prelinger, Voyager Films, Rick Lopez of Spectra Photo/Digital, Laura Lindgren, and Ken Swezey. Thanks also to Frederic Bechon, who assisted us during our first research trip to Paris.

Paul Sanchez and Mary Trunk were early supporters of the project, and their initial donation and belief in the book gave us a crucial boost. Eternal thanks to the Museum of Jurassic Technology in Los Angeles for its encouragement and role as fiscal sponsor.

We would like to express our deep gratitude to Lisa Silver for her careful scrutiny of the writings and unflagging enthusiasm and support for the project. We are also grateful to John Borruso, whose early design work helped us to visualize Painlevé's work in book form. We would also like to acknowledge Monique Sicard of the CentreNational de la Recherche Scientifique in Paris for her initial research into the life of Jean Painlevé.

Brigitte Berg would like to thank Florence Raab and Pauline de Montaigne, who helped keep Les Documents Cinématographiques afloat during the research of this book, and Yvonne Halsman, Jean-Pierre Jeancolas, Claude Jouin-Toulmond, Sylvie Lindeperg, Virgilio Tosi, and Luce Vigo for their generous support.

The seedling of this book was planted at the Exploratorium in San Francisco where the first U.S. retrospective of Painlevé's films was presented in 1991.

Thanks to Maurice Bazin, Liz Keim, the San Francisco French Consulate, and Kathy Geritz of the Pacific Film Archive in Berkeley for making that possible.

Finally, we would like to thank Jane Brown who initially brought the book to the attention of MIT Press, our editor at MIT Roger Conover for his interest and expertise, Julie Grimaldi who navigated us through the publication process, Kathleen Caruso for her thoughtful editing of the manuscript, Jean Wilcox for her beautiful book design, and everyone at MIT Press who helped bring *Science Is Fiction* to print.

Andy Masaki Bellows and Marina McDougall, San Francisco

For information on films available for programming, please contact:
Les Documents Cinématographiques
38, avenue des Ternes
75017 Paris, France

INDEx

Page numbers for illustrations appear in italics.

Académie des sciences, 5, 11–12, 17, 117, 172
Acera or The Witches' Dance, 50, 52, *53*, 178
Actualités françaises. *See* France Libre Actualités
Anthropomorphism, 50–51, 54–55, 136
Apollinaire, Guillaume, 12, 175
Armstrong, Louis, 52
Artaud, Antonin, 61, 62, *62*, 63, *63*, 173–174
Artistic and Technical Center for Young Filmmakers (CATJC), 33–34
Association for Photographic and Cinematic Documentation in the Sciences, 17
Association for Worldwide Radio-Television Broadcasts (ARTEM), 39–40
Avant-garde, 9, 12, 19. *See also* Surrealism

Bataille, Georges, 19
    Documents, 19
Baudelaire, Charles, 85
BBC (British Broadcasting Corporation), 40
Beausoleil, Claude, 41
Bellini, Vincenzo, 20
Bertrand, René, 20, *21*, 141, 142
Blank, Les
    Burden of Dreams, 55
Blue Beard, 20, *21*, 141–143
Boiffard, Jacques, 9
Bouligand, Yves, 43
Bréchignac, Jean-Vincent, 142

Bresson, Robert, 34
Les Dames du bois de Boulogne, 34
Breton, André, 175–176
Bull, Lucien, xvii, 167–168
Bulletin de recherche, 164
Buñuel, Luis, xvi, 147
L'Age d'or, 13
Un Chien andalou, 13
Land without Bread, xv
Burlesque, 54–55

Cahiers du cinéma, Les, xvi
Calder, Alexander, 9–10
Cantacuzène, Alexander, 41
Caprella and Pantopoda, 19, 50
Chagall, Marc, 19
Ciné-clubs, xv, 13, 35. *See also* French Federation of Ciné-Clubs
Cinémathèque française, 3, 35, 37
Clair, René, 31
Entr'acte, 13
Clairin, Georges, 5
Claoué, Dr. Charles, 17, 34, 164
Cloche, Maurice, 33
Club des sous-l'eau, 3, 27–29, *30*
Cohl, Emile, 7, 20
Comandon, Dr. Jean, xvii, 17, 167, 168, 172
Committee for the Liberation of French Cinema (CLCF), 34
Committee for the Organization of the Cinema Industry (COIC), 34
Common Front, 31
Conté, Pierre, 53
Cousteau, Jacques, xvii, 145, 153, 169
Crevel, René, 12

Dali, Salvador, 147
Dance, *27*, 52, 53, 54, 56. *See also* Burlesque
Daphnia, The, 19, *18*, 134
de Corlieu, Louis, *27*, *29*
de Falla, Emmanuel, *27*
de Gaulle, Charles, 33, 34, 35, 177
Dekeukeleire, Charles
    Ancient Faces, Modern Faces, 155
de Roubaix, François, 43, 179
    "Antarctica," 43
Deslaw, Eugene
    The March of Machines, xv
Director of French cinema, 34–35, *35*, 177
Discovery Channel, xviii
Disney, Walt, xvi, 50–51
    Fantasia, 52
    The Little Corner of the Earth, 153
    Principles of Air Navigation, 36
Doyen, Dr. Eugene Louis, xvii, 168
    Separation of the Siamese Twins Radika and Dodika, xvii
Dreyfus, Alfred, 5
Dreyfus, Jean-Paul (Le Chanois), 34
Drunkards' Club. *See* Club des sous-l'eau
Dufour, Achilles Pierre, *32*, *32*
Duhamel, Georges, 17

Ecole Polytechnique, 5, 7
Eisenstein, Sergei, *22*, *22*, 171
    Battleship Potemkin, 20–22
Ellington, Duke, 52
    "Black and Tan Fantasy," 178
    "Echoes of the Jungle," 178

Emmer, Luciano
Earthly Paradise, 154

Faure, Elie, 19–20
Federation of Spectators, 34
Film programs, xvi, 17, 36, 39, 138, 164
Flaherty, Robert, xvi, 150
Fourth Dimension, The, 32
France Libre Actualités, 34–35
Franju, Georges, 35, *36*
Blood of the Beasts, 35
Hôtel des invalides, 152
French Cinema Committee for Helping Children, 31
French Federation of Ciné-Clubs, 35
French Public Television, 40
French Solutions, 177
Freshwater Assassins, 39, 52, 139, 147
Friends of the French Republic, 31
Friends of the Polish Nation, 31

Gabin, Jean, 31
Gasparcolor, 20, 143
Godard, Jean-Luc, 41
Breathless, 41
Goll, Ivan, 12, 61, 173, 175
Gras, Enrico
Earthly Paradise, 154
Grierson, John, 37

Haesaerts, Paul
From Renoir to Picasso, 155
Halsman, Philippe, 25, *26*, 27, *30*, 31–32

Hamon, Augustin and Henriette, 9, *8*
Hamon, Geneviève (Ginette), 9–11, *8*, *10*, *11*, 13, 25, 41, *42*, 61, *91*, 126–127, 128, 131, *137*
Henry, Pierre, 179
Hermit Crab, The, 20, *18*, 133
Herzog, Werner, 55–56
    Fitzcarraldo, 55
Hyas and Stenorhynchus, 50

Ichac, Marcel, 153
Institute for Advanced Film Studies (IDHEC). *See* Artistic and Technical Center for Young Filmmakers (CATJC)
Institute of Scientific Cinema (ICS), xvi, 35–36, 125, 126, 163
International Association of Science Films (AICS), 36–37, 145, 164
Ivens, Joris, xvi, 22, 37, 150
    The Bridge, xiv
    Rain, xv

Jacob, Max, 171
Jacob, Maxime, 61, 173
Jansen, Pierre, 52, 178
Jaubert, Maurice, 20, 142, 178
Jazz, 3, 52, 147, 178
Joyce, James, 171

Lamorisse, Albert
    Bim, 152
Langlois, Henri, 3, 37
Léger, Fernand, 19
    Ballet mécanique, 13
Le Prieur, Yves, 27–29, *28*
L'Herbier, Marcel, 33
Liquid Crystals, 41–43, *44*, 179

"Live Endoscopy," 40
Lods, Jean, 33
Lotar, Eli, 9
Love Life of the Octopus, The, xiv, 41, 49, 50, 179
Lycée Louis le Grand, 7–9

Madison, John, 36–37, *36*, *37*
Marey, Etienne-Jules, xvii, 45, 142, 146, 165, 166
Méliès, George, 7, 20, 141
Methuselah, 12, 173–174
Milhaud, Darius, 178
Miracles theater, Les, 19
Montagnier, Luc, 41
Moss, Armand, 61, 173
Moussinac, Leon, 33
Murnau, Friedrich Wilhelm
    Nosferatu, 147
Musée de l'Homme, 145, 146
Musée Pédagogique, 17
Music, 20, 40, 43, 52, 142, 178–179. *See also* Jazz
Muybridge, Eadweard, 146

National Geographic, xviii
"Nature Revealed by Cinema," 39
Naville, Pierre, 12
    The Queens of the Left Hand, 12
Notation for Movement, A, 53, *54*
Nova, xviii

Octopus, The, 19, 133, 176

Painlevé, Paul, 3–6, *4*, 7, 12, 22, 31, 171, 174
Painlevé equations, 5
Pal, George, 141, 143
Parat, Dr. Maurice, 11, *11*
Pasteur Institute, 33, 176
Perrault, Charles, 141
Pétain, Philippe, 6, 33, 177
Petit de Villeneuve, Marguerite (Gaëte), 5, *4*
Pigeons of the Square, 43–45
"Poets of the Documentary," 39
Popular Front, 31
Prévert, Jacques, 12, 175–176
Prévert, Pierre, 9, 12, 175
Ptusko, Alexander, 143

Rasmussen, Knud
    The Wedding of Palo, xiv
Ray, Man, xv, 19
    L'Etoile de mer (The Starfish), xv–xvi, 19
Raymond, André, 15–17, *16*, 20, 25, 126, 127, 128, 131, 172
Raynaud, Henri (Riri), 34
Resistance, The, 3, 178
Resnais, Alain, 154
Reverdy, Pierre, 12
Richter, Hans, xvi
Romero, George, 52
Roscoff Marine Biology Station, 9, 41, 174
Rouquier, Georges, 34
    Farrebique, 34

Sadoul, Georges, 39
Saint Michel theater, 7

Science and Film, 164
Scientific Film Association of London, 164
Scientific Work of Louis Pasteur, The, 145
Sea Ballerinas, 41
Seahorse, The, 23–25, *24*, 50, 139, 176, 178
Seahorse jewelry (Hippocampe), 25–27, *26*, 33, 176
Sea Urchin, The, 19, 40, 133
Sea Urchins, 40–41, 57
Sennett, Mack, 7
Servanne, Michel, 17
Shaw, George Bernard, 9
Shrimp Stories, 41
Similarities between Distance and Speed, 32
Simon, Michel, xvi, 15, *16*, 31, 172
Simplifilm, 32, *32*
Smigly-Rydz, Edward, 31
Sorbonne, 9, 11, 12, 15, 172
Starevitch, Ladislav, xv, 141, 143
Stickleback's Egg: From Fertilization to Hatching, The, 17–19, *18*, 172–173
Storck, Henri
    Ancient Faces, Modern Faces, 155
Studio des Ursulines, 19, 149
Studio Diamant, 19, 176
Sucksdorff, Arne
    The Rhythm of the City, xvi–xvii, 145
Sufism, 56
Superior Technical Committee (CST), 34
Surrealism, 3, 12, 117, 147, 175–176
Surréalisme, 12

Tanguy, Yves, 147
Tchernigovtzeff, Catherine, 41

Television, 39–40
"Theater of Derision," 45
Ty an Diaoul, 9–11, *10*

Ubu, Père, 147
UFA (Universum Film Aktiengesellschaft), 153
"Under the Microscope," 40
Unknown Woman of the Six-Day Race, The, 15–17, *15*, *16*, 172

Vampire, The, 33, 50, 147, 176–177, 178
Varèse, Edgard, 41, 178
Vertov, Dziga
    The Man with the Movie Camera, xv
Video, 43, *44*
Vigo, Jean, xvi, 13–15, *14*, 20
    A propos de Nice, xiv–xv, 13
    L'Atalante, xv, xvi, 13, 15
    Zéro de conduite, 13, 20
Voyage through the Sky, 32

Wintrebert, Paul, *8*
World Committee Against War and Fascism, 31
World League of Human Rights, 31
World Union of Documentary Filmmakers, 37–39, *38*, 149
Wright, Wilbur, 5

Ylla (Kamila Koffler), 31–32

Zimbacca, Marcel
    L'Invention du monde, 152
Zola, Emile
    "J'accuse," 5